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[OFFICIAL NOTICE.]

Where to Find the Western Gas Association's Exhibit, and the Custodian Thereof, at the World's Fair.

To the Fraternity: The exhibit of the Western Gas Association, at the World's Fair, St. Louis, is located in Section 33A, Liberal Arts Building, where Mr. Fred. R. Persons, who is in charge of the same, will always be on hand to receive visitors and to explain anything that requires explaining.

[NOTICE.]

Twelfth Annual Meeting, Michigan Gas Association.

JACKSON GAS COMPANY,
JACKSON, MICH., July 20, 1904.

To the Members of the Michigan Gas Association: Preparations for the meeting of the Michigan Gas Association, to be held in Jackson, September 21st and 22d, 1904, are now well underway. The following papers are promised definitely:

"Retort House Practice in a Small Works," by Mr. George C. Turner, Secretary Coldwater (Mich.) Gas Light and Fuel Company.

"Temperatures as Applied to the Production and Purification of Coal Gas," by Mr. V. F. Dewey, Asst. Supt., Detroit City Gas Company.

"Commercial Lighting," by Mr. R. Schacklette, Manager Adrian (Mich.) Gas Company.

Also, a most interesting report on "Naphthaline," by Messrs. White and Ball.

In this connection let me call your attention to the "Question Box," with its special feature known as the "Trouble Box," which is in charge of Mr. E. F. Lloyd. Every member can help make this special feature a success by sending to Mr. Lloyd good, live questions or by relating their experience, or by asking help on the troubles they have had during the past year. If you have no questions to ask, no new experiences during the past year, and have encountered no troubles, this "Question Box" cannot help you. If the contrary is true, write to Mr. Lloyd, and *do it now*. Remember, all these things will be referred to some member for investigation, all of which takes time, and you should be as prompt as possible in communicating with Mr. Lloyd.

Don't forget to bring an application for membership from some fellow not now in the fold, and *be sure to attend the meeting yourself*.

Wishing that I will have the pleasure of welcoming you in Jackson,

Yours very truly, S. E. WOLFF, President.

[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

OFFICE OF EDITOR WRINKLE DEPARTMENT,
ST. LOUIS, MO., July 25, 1904.

To the Members of the Western Gas Association: We again invite contributions to the Wrinkle Department of the Western Gas Association for the meeting of 1905. The Editor wishes to call the attention of the members of the Western Gas Association, and of the gas fraternity at large, to the fact that the "Western" has done good work in this department in the past; that its Wrinkles have been of value to many, and that it proposes to continue the good work.

The Editor further wishes to suggest that an earnest effort be made to improve the quality of the Wrinkles submitted, as a great many of the devices, while of undoubted practical value, are such as any gas works' foreman should know. We desire the Wrinkles which have a greater bearing on the scientific and technical portion of our business. Of course, there will always be room for the little, handy, practical devices, which so often help us over the rough places. We will gladly receive them, but we should all aim to place the gas business on a par with other scientific and engineering enterprises which are practically in a basis of exact knowledge and high efficiency.

To that end, therefore, we desire to secure a large collection of Wrinkles for the 1905 meeting. Give us the benefit of the mathematical, chemical, thermal and other devices which have helped you in designing or improving your plants; do not hesitate to send in the practical devices which are not on record so far; submit the ideas which have made the business end a success; and, finally, let every individual contribute his portion, so that the result may be worthy the achievements of the past, and a credit to the Western Gas Association.

The following wrinkle is submitted as a sample to guide others somewhat in working out their contributions to this department. This describes a method of regulating the pressure on the outlet of a holder in proportion to the rate of sendout, and was contributed by the writer to another Association some time ago.

"The essential idea of street pressure regulation is to maintain a certain pressure at the consumers' meters within a small percentage either way of the fixed pressure. As the consumption increases or decreases,

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the holder pressure should be raised or lowered. This is usually done by having recording pressure gauges located in the district supplied by the holder, and raising or lowering the holder pressure until the best average for the district is reached.

"Now, it is, of course, true that the same conditions of consumption never obtain on successive days or months, and, therefore, the following automatic indicator was suggested by the writer: In the outlet pipe of the holder we place a Pitot tube facing the holder. Naturally, the opening from the Pitot tube which faces the stream of flowing gas gives the pressure due to the sum of the static head plus the impact or velocity head, whereas the side openings give the pressure due to the static head only. Therefore, any variation in the rate of flow of the gas is at once indicated by the variation in differential pressure from the two openings of the Pitot tube.

"By using a very sensitive differential pressure gauge, we can thus observe this variable rate of flow. It is, of course, necessary to calibrate the instrument for each holder to be able to tell what pressures to carry on the outlet pipe for each division on the sensitive differential gauge, and it would probably be well to check this three or four times during the year. The Laclede Gas Light Company has so far secured three satisfactory types of extremely sensitive differential pressure gauges, and we have arranged them with two scales, one of which shows the divisions in millimeters and the other gives the proper pressures to be carried on the holder outlet opposite the indicator on the gauge. The writer purposely refrains from adding drawings or too much detail to the above description, as he merely wishes to submit one idea, which he hopes will suggest many others to help swell the contributions."

We must start the work at once; therefore, please send your ideas to the Editor, 716 Locust street, St. Louis, Mo., and oblige, Yours truly,

W. A. Baehr, Editor Wrinkle Department.

BRIEFLY TOLD.

Death of Mr. Noel E. Sisson.—In the death of Noel E. Sisson, who passed away at his home, No. 92 Lancaster street, Albany, N. Y., the morning of last Thursday, the gas meter industry of America loses one of its pioneers. Mr. Sisson, who was in his 83d year, was a partner in the firm of D. McDonald & Co., of Albany, N. Y., since 1859, and it may safely be said that in point of age alone he was the veteran of the gas meter trade. The funeral services were held the afternoon of last Saturday.

Notes——

All signs point to the fact that a merger arrangement between the controllers of the properties of the Baltimore Consolidated Gas Company and of the United Electric Light and Power Company, of Baltimore, is close to completion. It will be a good thing for the electric end of the deal, the fortunes of which Company were, to say the least, of the negative sort. On the other hand some of the shareholders in the Consolidated Company are wondering why the banking syndicate got weak on gas at a time when the financial position of the Company was at its best.

The Radio-Incandescent Burner Company has been incorporated. The headquarters of the concern are in Newark, N. J., and it is capitalized in $210,000. Its purpose is to manufacture and deal in gas burners of all kinds. The attorney for the Company is Mr. E. S. Hosmer, 82 Nassau street, N. Y.

The Board of Gas and Electric Light Commissioners of Massachusetts has authorized the Waltham Gas Light Company to issue 900 shares of additional capital stock, the minimum selling price of which is put at $140 per share.

The charter for the newly organized concern to supply gas in Elizabethtown, Pa., under the title of the Elizabethtown Gas Company, has been filed. The Treasurer of the Company is A. G. Heisey.

[Communicated.]

Novel Means of Increasing Gas Output.

By Mr. P. Eves, Paterson, N. J.

The Milwaukee Gas Light Company is to be congratulated on having opened a cooking school for its staff of canvassers. We speak from actual experience. To teach gas consumers how to use gas intelligently and economically is one of the best policies that a gas company can adopt. We have proved it to be one of the principal elements of success and to account, in a remarkable degree, not only for a material addition in the output of gas, but for a decided diminution in the work of the complaint department. "A satisfied and contented customer is a gas company's best asset." To teach the solicitors how to use gas and how to manipulate the gas range properly is one of the best means of securing the instruction of the company's new patrons; but "a *little* knowledge is a dangerous thing," and, therefore, the lessons, especially to the staff of salesmen, should be comprehensive and thorough, giving special attention to the elementary, but most important items of management of the burners, heating the ovens and securing the greatest economy in preparing a meal.

It is perhaps almost generally known that Paterson has met with success in its output of gas ranges and in securing new business. We have probably struck the keynote of this success in stating our belief and our practice in educating the public in the proper use of gas. A few "gas tips" from our experience may be generally acceptable, and if some of the ideas mentioned be perhaps novel and unprecedented, they are excusable on the ground that they have been productive of popular benefits to the gas consumers themselves and of a considerable addition of new gas business. A little over three years ago we decided to educate our solicitors in the use of the gas range. The lady demonstrator engaged for this work was requested to give prominence, not so much to the attractiveness of novel menus as to the fundamental science of domestic economy and of ordinary household cooking. Those instructions to canvassers were followed up by a second series of lessons, by another able lady demonstrator, and the men, thus equipped with a fund of valuable knowledge and ideas, met with welcome in the homes aud with a marked increase in the number of orders booked. In this connection we resolved to follow up every gas stove sale and to put the delighted purchaser on the right track at the very beginning of her new cooking experiments. One of our canvasser students, taking a deep interest in this work, became an expert cook and an authority on all matters pertaining to the gas range. We had thus gained another advantage and secured our own demonstrator. We have used his expert services in imparting instruction and advice to the other and newer salesmen. He has dealt successfully with all our stove difficulties, and secured the use of the broiling oven where otherwise it would not have been used at all, or very seldom. He has made popular in this city home-baked bread, biscuits, muffins and other home necessities, and in many cases has caused the gas range to be the only cooking appliance used. Realizing the value of thus training gas consumers, we sought a more wholesale method of dealing with the question and found it. We wrote to the ecclesiastical head of every church throughout the city, offering the services of our home-made demonstrator to give a practical cooking demonstration to the ladies of the respective congregations, or to any educational classes or societies in connection with the church. The churches gladly fell in with the idea, and the history of these demonstrations is a history of public gratitude and of business growth. In a population of a little over 100,000 we thus reached a large proportion of gas consumers and others on the lines of the mains, and sold, in one week alone, nearly three car loads of gas ranges. The attendance at these church demonstrations sometimes reached the extraordinary number of 175 to 200, and we record in the report the unique fact that in one instance the public of the parish was invited to attend our cooking lecture by the ringing for half an hour of the church bell. Our solicitors attended in the double capacity of ushers and salesmen, booked a number of sales on the spot, received requests to call at a later date and dealt with difficulties and complaints, thus finding a productive field for new business and for our work. The advertising accomplished by the effort was incalculable. Notices were given out from the pulpit on successive Sundays, and the announcements to the congregatious were disseminated by the people throughout the various parishes, thus bringing the question of the gas range before the public in an extraordinarily successful and wholesale manner. The subsequent canvass in the influenced territories resulted in "breaking all previous records" for sales, not only of gas ranges, but of all kinds of domestic appliances. The public press commented favorably upon our work and, seeing the popularity of the demonstrations and the friendliness of the churches, gave the gas company support in advocative newspaper paragraphs. We have made arrangements to continue and to repeat these demonstrations through the fall and winter and, in connection with the second series, to have an exhibit of lighting appliances and a model meter dial as affording a means of illustrating the best and proper use of gas as an illuminant as well as a fuel and of teaching the reading of the meter. Knowing now that these meetings are so beneficial and popular, that they are welcomed by the authorities of the churches and attended by large numbers of gas consumers and non-consumers as well, it is almost surprising that such a productive field has not hitherto been more generally cultivated. We are of the opinion, however, that the gas companies interested in securing a crop of contented clients, in adding new customers to their ledgers and in recording a larger number than ever of gas stove sales will do well to consider the advisability of adopting or developing this popular, productive and inexpensive work.

[Report, as Furnished by the Secretary—Continued from Page 209.]

PROCEEDINGS OF THE CONGRESS OF GAS ASSOCIATIONS OF AMERICA.

HELD IN LIBRARY HALL, HALL OF CONGRESS, LOUISIANA PURCHASE EXHIBITION, ST. LOUIS, MO., WEDNESDAY AND THURSDAY, JUNE 15 AND 16.

THURSDAY'S SESSION, JUNE 16.

[GAS ASSOCIATION WORK,

by Mr. H. L. Doherty.—Continued from Page 209.]

The Ideal Association.—It is always well to have some ideal plan towards which to work. Disaster may follow revolution, but by evolution toward an ideal plan, constant and steady progress should be made until the ideal is realized. It seems to the writer that:

1. Under proper conditions there should be one, and only one, association of national or international character.

2. This association should have members from every gas company, including practically all officers and ambitious employees, and should also embrace those men doing gas engineering work, whether in connection with gas engines or other industrial gas apparatus.

3. This association should have ample funds for prosecuting work for the benefit of the gas fraternity in general.

4. The association should have suitable and permanent headquarters, and in view of the fact that all of the large engineering societies make their headquarters in New York city, these headquarters should be in New York and preferably in the proposed Union Engineering Building.

5. Local sections should be encouraged on something like the plan adopted by the American Institute of Electrical Engineers, and these local sections should be furnished with gas literature and other papers for discussions and should be encouraged to meet freqeuntly.

6. Monthly meetings should be held at the headquarters of the association, and locally by the local sections.

7. The association should designate such subjects upon which desirable knowledge is lacking.

8. Great efforts should be made to locate all persons capable of becoming contributors to association work and to encourage them to contribute.

9. Means should be devised to encourage study and individual improvement amongst the gas fraternity.

10. Our literature should be analyzed, classified, indexed and revised, and if necessary rewritten, for the sake of putting it in more available form.

11. The association should devise methods for encouraging investigation and research work.

12. Professional educators, engineers and scientists should be made interested in our work and, if possible, induced to contribute to our literature.

13. The association should define what constitutes a gas engineer, and should take steps to establish gas engineering as a recognized profession.

The above summary would certainly show an ambitious undertaking, and to many of the gas fraternity it would probably seem a foolish one. They would perhaps feel that, inasmuch as we have successfully conducted the gas business to its present development without any such elaborate system of organization, such a system is therefore not necessary now. The only answer that can be made to this is that the same statement could probably have been made against the formation of gas associations if no gas associations had ever been organized. We will assume, however, that the plan is at least worthy of further consideration, in which case it will be necessary to deal with some of these headings, which indicate only the end sought, and endeavor to find what means would have to be adopted.

Amalgamation into one Association.—We will assume that a new association would be formed which we will call the "American Institute of Gas Engineers and Managers," and that our present associations will be disbanded or will become local sections of the American Institute. We will also assume that this amalgamation will not take place until the present activity which exists amongst the various associations has resulted in securing membership from practically every gas company and from practically all men interested in gas engineering problems.

To secure ample funds the membership will consist of, first, gas companies, to be known as "contributing members, and the dues will be based largely on "what the traffic will bear." We will assume that gas companies will pay annual dues of $10 each, plus $1 per 1,000 of population served by them up to and including 90,000, but that no company shall pay to exceed a total fee of $100 per annum. Officers and employees of these companies will be entitled to individual membership according to classes hereinafter designated, and their yearly dues will be $5 per member. Others interested in gas engineering, but not associated with a company which is a contributing member, will be admitted to membership on the same terms as the officers and employees of contributing members, except that their dues will be $10 per year instead of $5 per year.

From time to time, as conditions seem to demand, divisions of membership will be made into special branches. The first division will be a technical division, which will have its own officers who will, however, be subordinate to the general officers of the association. This technical division will have members designated by classes, as provided for later.

Local sections will be encouraged, particularly where many gas companies are situated closely together, and where there are large companies having enough engineers and interested employees to meet and discuss the work brought out in the other various local sections and at the meetings of the Institute, such Institute meetings being virtually the original local section meetings. To enable officers and employees of gas companies to attend the meetings, two annual conventions will be held at fixed points, or at such place as each convention may designate for the next meeting point. One of these conventions will be the technical convention, in which only engineering problems of the gas business will be taken up and considered. The other convention will be preferably a general convention, where all other subjects except technical and engineering matters will be considered. We will assume that the technical convention will be held in February or March of each year, prior to the season of new construction work and after the period of greatest maximum demand, and that the general meeting will be held in October of each year.

The division of membership will be as follows: First, contributing members, being company membership; second, general members, being advanced members not identified with the technical division; third, associate general members, being all members that are not full general members or that are not identified with the technical division; fourth, technical members; fifth, associate technical members.

No distinction will be made amongst the contributing members, but an attempt will be made to secure representation from every gas company tn the country, it being the understanding that the association will protect their investment as far as it lies within its power so to do, and assist them in every way possible. The general members will be individuals entitled to distinction, either for extraordinary proficiency in the gas business or for active or valuable work in promoting the interests of the association. All general members shall originally be elected as associate general members and shall afterwards be elected to full generalship only upon the approval of a properly constituted board. The fourth class of membership shall be the technical members, who shall all be originally elected as associate technical members, but may be elected to full technical membership for extraordinary proficiency in engineering or scientific work, but only after contributing something of value to the proceedings of the association and preferably along the line of original investigation or research work. The fifth class, associate technical members, shall be elected to full technical membership only upon evidence of proficiency in professional work and suitable contributions to the proceedings of the Institute, and upon the unanimous recommendation of a properly constituted board.

Professional educators and scientists may be elected to associate technical membership or associate general membership without dues, and may be advanced to general membership without dues upon the same qualifications and conditions as would govern the advancement of other members, the only distinction being that they would pay no dues, it being the expectation that these men would contribute more to the welfare of the Institute than the Institute would contribute to them. The condition would be imposed, however, that they would either be dropped from membership at the end of the year or re-elected each year.

The plan here suggested for division memberships need not be dwelt on at length. The two primary objects are: First, to insure to the Institute sufficient funds; second, to stimulate individual progress, provide for the recognition of worthy members and encourage contributions by holding out the inducement of advancement in membership.

Means for Locating Desired Information.—Probably every gas engineer has spent a considerable portion of his time looking for information that could not be found in any of the text books. During the last year, the writer has made a fruitless search on several problems, failing to locate the information necessary for this purpose. A few examples may bring out more plainly what is intended by "information desired."

Example A.—It was desired to know the specific heat at various temperatures of superheated steam contained in the combustion products of a gas appliance. No exact information could be found.

Example B.—The heat conductivity of firebrick was wanted. No reliable information could be located.

Example C.—The specific heat of firebrick material was wanted. No reliable information could be found.

Example D.—The latent heat of various ingredients of crude oil was needed. No complete information could be obtained.

Example E.—It was desired to build a highly efficient air inductor, and the laws of induction and the method of determining the efficiency of the inductor were wanted. No reliable laws could be found, and no prescribed method could be had for determining the efficiency of this apparatus. Experimental work had to be resorted to.

Example F.—It was desired to know at what rate firebrick material would give off the heat stored in it to the surrounding gas and oil. No information on this subject could bs found. In connection with this subject it was also desired to know whether the core of standard sized brick did any work whatever, and if so, how much. It was believed that the transmission of heat from the center of the brick was too slow to be effective, and that the outer portion of the brick did the bulk of all the work and the core practically none.

These are simply a few examples of the problems which the gas engineer meets every day. Joint participation in a scheme like the Question Box will locate information to be desired and will perhaps bring out the desired information.

Accuracy of Question Box Information.—As the Question Bex is now conducted, the information contained in it cannot always be relied upon as accurate. This, however, can be largely overcome by putting the Question Box, after publication, into the hands of a Revision Committee, whose duty it will be to see that all questions are: First, completely answered; second, reliably and properly answered; the committee supplying such information as may be lacking, as far as it lies within its power so to do. If they cannot supply complete and reliable information, it is because it is not available in our present literature.

The Supply of this Unavailable Information.—A board should be created to stimulate, encourage and direct research work. The Revision Committee of the Question Box will turn over to this board all matter on which information is wanted, and it will then be the duty of this board to supply this information by some means, and if necessary by putting investigators to work. It is to be supposed that this board would have the active support of the more aggressive gas companies, would encourge thesis work on the part of students of universities, and would induce engineers, officers and employees of gas companies to undertake this investigation work. Failing to secure it without expense to the association, it would be within the power of the board to incur expenses to a maximum representing the actual cost of the work for materials, labor, etc., plus a payment for supervisory work on the part of some engineer who might be an employee of some gas company, or an instructor or professor in a college.

A Literature Revision Board..—This board would undertake to digest and index all literature directly pertaining to the gas business or of value to the gas fraternity. They would be given ample funds to employ proper persons for doing the reading and indexing. Card indexes would be furnished to all members and kept up-to-date by mailing to members additional cards at periodic intervals.

The Building of a Handbook.—Efforts would be made to stimulate original work on the part of the members towards building up a complete handbook for gas engineers, somewhat of the character of "Kent's Handbook for Mechanical Engineers." A list of subjects would be furnished to volunteers, permitting them to decide upon which subject they would compile the necessary information for a handbook. These data would be sent to the literature revision board, and as soon as possible a handbook would be published. If the funds of the Institute did not permit this publication to be undrtaken gratis for the benefit of the members, a subscription would be asked for on the basis of say $20 per handbook. This $20 would be expected to cover the preparatory cost of the work and supply each subscriber with one copy. Supplemental bulletins would be furnished as new information should be obtained, and as soon as the mass of new information gathered would warrant doing so, the old handbook would be re-published with the additional information secured in the interim. Owners of handbooks would be permitted to exchange for the new handbooks, paying only the cost of reprinting the handbook from the old plates, with new leaves added for the additional information properly placed for ready reference. For instance, if the cost of this republication would not amount to more than $2 per volume, this would be all that would be asked in exchange for the new publication, in addition to returning the old handbook, which would be destroyed. Original subscribers would always be expected to pay their share of the original cost of publication. In other words, the first handbook would cost them $20, and each time they would exchange them the cost would be approximately $2.

By careful preparation, the writer believes that more information of value could be put in a small handbook of this character than is contained in the most complete gas engineering library now in existence.

Board of Awards.—To stimulate contributions to the Question Box, handbook, and investigation and research work, suitable awards would be given. Creditable certificates, properly engraved and suitable for framing, would be given for work done and information furnished. When a holder thereof would secure say 100 points in credit slips, he would then be entitled to receive a handsomely engraved certificate of appreciation, properly framed. For extraordinary work gold medals would be given. Recommendations would be made by each board to the board of awards, and the latter board would determine (their decision being final) what award should be made for each piece of work done. These awards would be made without distinction between classes of membership, and would also be given to non-members of the Institute.

Educational Board.—The present correspondence school of the American Gas Light Association would be placed in the hands of a board of directors, and if possible, its scope and usefulness increased. Joint education on the part of students, by availing themselves of other courses in regular correspondence schools, would be encouraged. A standard of educational attainments necessary for qualifying as a gas engineer would be determined upon, and, if possible, technical universities would be induced to provide a course in gas engineering, awarding a degree of Bachelor of Science in Gas Engineering. The master's degree would be given only after practical experience, and upon recommendation by the educational board to the university awarding the degree.

Board of Representatives upon Relations with other Engineering and Scientific Societies.—A great deal of the information needed in the gas business is also needed in other branches of engineering. The securing of this information by one technical society should suffice for all. Much of the work in engineering is common to two or more branches, and while specialism is the order of the day, yet there is a marked tendency towards the development of a universal engineer and universal and common engineering practice. We are drifting towards "engineers of energetics" as a body, and individually we are specializing on many minute branches of engineering. Most branches of engineering are simply a combination of the education of the physicist and the mathematician. For special branches, we need only add to these the education of the chemist and the electrician.

Co-operation between gas engineering societies in all countries, and also co-operation amongst all sorts of engineering societies is desirable. Some of our well-known American engineering bodies would welcome a closer affiliation between different engineering societies, and the building of the Union Engineering Building will do much to bring this about naturally. But this is a condition which can be largely anticipated.

It will be the duty of the board of representatives to co-operate with the representatives of other engineering societies for the mutual advancement of all. It seems particularly desirable that the American Society for the Promotion of Engineering Education should have the unqualified support of every engineering body. The engineering education of our young men is often intrusted to educators who do not come in close contact with any professional men except other professional educators.

Perhaps the most contemptible man and the most contemptible class are the chronic critics. They are the men who, as a rule, console themselves by criticizing what everyone else does and who never do anything themselves. These critics are particularly noticeable in matters pertaining to education. They speak with that self-sufficient confidence which can be born only of dense ignorance and, as a rule, ridicule all higher education and disparage the ability of men who have been given this higher education. That the present methods of engineering education leave noting to be desired, or that they are incapable of improvement, probably no one would attempt to maintain; but efforts at correction should precede criticisms, or at least criticisms should only be uttered for the sake of stimulating improvement or as a reason for changes. If the existing educational methods do not properly fit a student for practical work, it seems to the writer that the responsibility for this improvement does not rest entirely with the professional educator, but also with the practicing engineer and especially our

engineering bodies. It may be unreasonable to expect the practicing engineers, either individually or collectively, to devote their time to a solution of this problem, but if they insist upon exercising their privilege of criticising present methods, they, by inference, set themselves up as authorities on the question of how this education should be conducted, or at least of the scope of the education which the student engineer should receive.

Conclusions.—These views are presented to you for what they are worth. It is hoped that they may offer at least some suggestions for improvement. The recommendations made are not submitted necessarily for adoption, but rather for thought, consideration and discussion. To the writer's knowledge no general treatment of gas association work has heretofore been offered. The start must be made at some time. The introduction of a subject like this is of necessity apt to be crude and capable of refinement. Much of the matter contained in this paper is open to criticism and criticism will be welcome; but it is to be hoped that for the sake of progress the criticisms of those who disagree with the views expressed herein will be accompanied by concrete recommendations of better methods, and a justification of their criticisms.

Just before the conclusion of the paper, Mr. Doherty interpolated:

As you probably know, the British gas engineering associations are considering a scheme for affiliation. I have carefully watched the English "Journals," but cannot quite see what the object of the affiliation is. They talk about "In union there is strength," but there is nothing very definite about their plans as far as I can make them out, so I wrote to Mr. Walter King, the Editor of the *Journal of Gas Lighting*, London, England, asking him if he would not give me answers to a number of questions. I asked him to sum up his views and tell me what the object of the affiliation is and what they hope to accomplish. I have received his reply this morning. I expected to touch on the English attempt at affiliation in my paper, but I could not gather enough from the journals to feel safe in writing about it; but I take it from all I can hear now that they are aiming to bring about an affiliation of the gas associations and to discover the advantages of the affiliation later.

Discussion.

The President (Mr. Aldrich)—It has afforded me peculiar pleasure to preside during the reading of this splendid and remarkable paper by Mr. Doherty. Thanking you for the honor conferred upon me, Mr. Norris, I am pleased to again turn the meeting over to you.

The President (Mr. Norris)—I will now ask a man to take charge of the meeting who has at some time or other presided over meetings attended by almost everyone present, as President of one or other of the Gas Associations, and I again introduce Col. E. G. Pratt, of Milwaukee.

Mr. Pratt took the Chair.

Mr. D. McDonald, Louisville, Ky.—Mr. Doherty in treating a very large subject has covered it like a very large blanket. Before we go into a general discussion of it I want to ask the Congress to take up what I consider the most important recommendation in the paper, which is as follows: "Under proper conditions there should be one, and only one, Association of National or International character." With a view to testing the sense of this Congress as to whether or not that recommendation meets with the approval of the delegates, I offer the following:

Resolved, That it is the sense of this body that all of the gas men in North America should be united in one Association, with local chapters where conditions make them desirable. If the resolution meets with a second I desire to say a few words regarding it. [Seconded.] My object in offering the resolution in such brief form is that if we do not want to go into this movement at all it is useless to discuss details. If we agree on the movement as a whole it will then be time enough to take up the details regarding the proposition.

The President (Mr. Pratt)—The resolution is before the Congress for consideration. Is there any discussion upon it? [Cries of question.] The resolution was put to vote and adopted.

Mr. Donald McDonald—With a view to carrying out that resolution I offer the following:

Resolved, That a committee be appointed by the President of this Congress, consisting of two members of each association and three members representing the gas industry at large, which committee shall draw up a comprehensive plan providing for a single gas association, to be composed of the men engaged in the gas industry in North America, the plan to be submitted to each of the now existing gas associations for ratification or amendment, the committee to remain in existence and to continue to represent this Congress until such time as the new association has been organized and is in working order. If this resolution meets with a second I will say something in explanation of it. [Seconded.] My idea is that the only way that rivals can be brought together is through the mediation of a third party. I know of no individual and of no association that would answer the purpose of a third party in this case as well as this Congress. When this Congress adjourns I would like it to leave behind it a committee which can represent its authority and declare the fact that the Congress is composed of representatives of the whole country and of all the associations, as it is. I believe if this committee is appointed and the work left in its hands that in a short time we will have this movement, which we all desire, an accomplished fact.

Mr. E. G. Cowdery, St. Louis, Mo.—Mr. McDonald I think is mistaken to the extent that this Congress has no President. It is governed by the Presidents of all the Associations. If the Presidents of all the Associations will appoint a committee, I think the resolution would be quite acceptable.

Mr. Donald McDonald—I accept the suggestion and will make an amendment accordingly in the wording of the resolution.

Mr. John McIlhenny—I heartily approve Mr. McDonald's unacted-upon resolution. I think the only fault with the second resolution is that the representation from the different organizations is not large enough. I think that two men from each organization is not enough to properly represent the Associations on this committee, and I would favor a larger representation from the different Associations, increasing the committee, doubling it if you please.

Mr. Donald McDonald—My experience is that two men will work more effectively than a larger number of men. If there are two men from each Association it will be easier to get them together, and easier for them to do the work. I am not disposed to insist on details, however. If this Congress thinks a representation of four men from each Association will be preferable, I will incorporate it in the resolution.

Mr. A. E. Boardman, New York City—Do I understand that the amendment suggested by Mr. Cowdery is accepted? That the appointment of the members from the various associations be left with the President of each association?

Mr. Donald McDonald—That was accepted and is incorporated in the resolution.

The President (Mr. Pratt)—With that understanding I will put the question?

The resolution in its amended form was as follows:

Resolved, That a committee be appointed by the board of presidents of this Congress, consisting of two members of each association and three members representing the gas industry at large, which committee shall draw up a comprehensive plan providing for a single gas association, to be composed of the men engaged in the gas industry of North America; the plan to be submitted to each of the now existing gas associations for ratification or amendment, the committee to remain in existence and to continue to represent this Congress until such time as the new association has been organized and is in working order.

This was put to vote and unanimously carried.

Mr. D. McDonald—In order to make this matter complete I would like further to move that the Secretary of this Congress be authorized and instructed to act as the Secretary for this committee, his compensation to be arranged for.

Mr. R. Norris—I do not see any particular reason why the committee should not appoint its own secretary in some way. The conditions may be such as to make it desirable that they should do so. Possibly Mr. McDonald has some reason for covering the point now.

Mr. D. McDonald—My object is that, unless you appoint a chairman you have no way of getting a committee together. There is no central point to which the views of the various members can be sent. The committee will be appointed after the Congress adjourns, and the members of the committee will reside in many different cities. Some plan must be provided by which they can be enabled to act as a unit, and wishing to leave in the hands of the committee the selection of the chairman, I wanted to have appointed a secretary who could send out the various communications and enable the members of the committee to get together.

Mr. A. E. Boardman—I think the object could be attained by appointing a temporary secretary until the committee should meet and select its own secretary.

Mr. D. McDonald—I would be willing to accept that amendment.

The President (Mr. Pratt)—The question is that the secretary of the Congress shall act as the temporary secretary of the committee until the organization of the committee is effected. [Carried.]

Mr. T. D. Miller (New Orleans, La.)—One prop is missing in the structure which Mr. McDonald has so rapidly built. He has not pro-

vided in his resolution the means of appointing the three delegates at large, or if the amendment which was suggested, that there be six delegates at large, was adopted, for the appointment of the six.

Mr. D. McDonald—That amendment was not adopted.

Mr. Miller—How are the members at large that you speak of to be appointed?

Mr. D. McDonald again read the resolution and said: I originally had it President of this Congress, but my attention has been called to the fact that there is no President of the Congress, and in the shape in which the resolution is adopted the appointment of the committee would lie in the hands of the body of men who stand in the position of the Presidents of this Congress. Does that suit you?

Mr. Miller—I am the easiest fellow in the world to be satisfied. All I wanted to know is that the thing was provided for. If the presidents of the different associations who have been acting as chairmen of the Congress will get together and make the appointment it will be all right.

Mr. McDonald—I move, to settle the question, that the delegates at large be appointed by Messrs. Pratt, Norris and Doherty.

Mr. W. McDonald (Albany, N. Y.)—I suggest that the selection of the three delegates at large be left to the delegates appointed by the Presidents of the Associations—that the committee at large select these three men.

Mr. A. E. Forstall, New York City—I do not think there is any need for any further action than has been taken in the adoption of Mr. Donald McDonald's resolution, which provides that the board of presiding officers of this Congress shall appoint a certain committee, which committee is to consist of two members from each of the present existing gas associations, and three members from the representatives of outside gas companies who do not belong to the Associations. That covers the whole thing. These outside men are appointed by the same power which appoints the members of the committee from the Gas Associations. There is no necessity for any further action, as I see it.

The President (Mr. Pratt)—That is my idea of the situation, and any further suggestions will be out of order, as the matter is entirely provided for. Is there to be any discussion on the paper read by Mr. Doherty?

Mr. A. S. Miller, Baltimore, Md.—I am more than pleased to note that Mr. Doherty's paper has resulted in the taking of action by the Congress in the way I hoped it would be taken. It is undoubtedly better that there should be one gas association, and still better that there should be one association of engineers. The questions that Mr. Doherty wishes to solve, and which he quotes, are questions of an engineering association and are not especially adapted to the gas business. Regarding the general contents of the paper. I would say that the counts in the indictment against the gas engineer are so many and so varied that about the only thing I can do, or that the gas engineer can do, not having had time to prepare his defense, is to enter a general denial and the plea of "Not guilty." In the first place, the reason that there are no specially educated gas engineers might well be answered by reference to page 5. There it is stated that the gas business is a manufacturing, transportation, collection, investment, mercantile and development business. As far as I know, there are no special steam railroad engineers educated at college as such, and there are no special street railway engineers. These are specialties or generalizations, if I may so put it, which are taken up after a man leaves college, and very few of us would have either the disposition or the time to spend at college in studying the specialties that are required. Our technical training supplies the means whereby we can decide what is right and what is wrong, or to get at the truth. College education supplies the fundamental requirements to teach us what is the truth, what is possible and what is impossible. Education further teaches us how to apply that knowledge and then turns us out to specialize afterwards. I think it is a mistake to attempt to specialize too early. We should learn what is true, and we should decide very clearly between what we know and what we do not know. There is too much assumption of facts and too great a tendency to follow along a rut because we have always travelled in that rut and because our predecessors travelled in that rut. Mr. Doherty quotes special cases. He says: "There is no standard method of conducting steam in and about a gas works." Why should there be? There are no standard gas works; and why should there be a standard gas works? There are no two pieces of land exactly alike and there are no two conditions that are identical. If we are trained to realize the conditions as presented to us and to know what is best for any special situation, it does not require us to standardize the works. If a man realizes the possibilities of each piece of apparatus and understands the problem of handling raw material and his finished product, he can build his gas works to suit himself instead of buying it by the yard. Mr. Doherty refers to Mr. Glasgow's paper and states that no organized efforts have been made to create a standard for measuring the efficiency of the class of apparatus tested by Mr. Glasgow. After Mr. Glasgow's paper I do not think any is needed. That is a standard. I think also that gas associations should not attempt to design standards. I think the gas associations should simply disseminate the truth and the facts, leaving it to individuals to design apparatus. If a new piece of apparatus is put on the market I think that it is well, if possible, for the gas association to determine on its capabilities with possible suggestions, but I do not believe in having things tied down to specific standards. Take a gas range, for instance: Why should we tie down to a specific standard when there are 10 or a dozen ranges manufactured, each of which is as good as any other, and each of us may have his own preference for one special style? Why should we throw the other 11 men out of business and buy the twelfth man's appliance, or make the 11 men change their appliances in order to conform to a standard? I do not think we should do any such thing. When it comes to street main specials or any other material which works in connection with other material, then it is important that we should have standards, but in the case of material which does not work in connection with other material, it is not necessary to have a standard and it should not be required. It would be very well for us to have tests of appliances to show what they can do—what the final limit of efficiency is; but I see no reason why the design of that appliance should be standardized as long as the design is sufficiently good and comes somewhere near the maximum theoretical efficiency. I think Mr. Doherty's paper is the beginning of a grand, great work for the gas associations of America, and I feel a sense of deep personal gratitude to him for bringing it before us.

Mr. A. E. Forstall—I want to go a little more fully into the point raised by Mr. Miller in criticism of the scheme of education advanced in the paper. The chief trouble with our present engineering education, at any rate undergraduate engineering education, is that it specializes too much. Instead of starting a new course in gas engineering as an undergraduate course, we should wipe out half the courses in special engineering that are already on the college list. What an engineer requires as a starting point is a good knowledge of natural laws and how far these laws can be controlled by man. Besides that he should have a good knowledge of the English language, if he is an Englishman or an American, or of his own native language, if he is of another nationalty. He also should have a certain amount of business training. When he has gotten these he is ready to be made a good engineer, but he cannot be made a good engineer by any special course of instruction in college unless he is willing to spend 8 or 10 years there. He must get his general underlying education first, and get that as the result of his undergraduate college course, then he can specialize afterward. I think it is safe to state that nine-tenths of the most prominent electrical engineers in the country had practically no instruction upon electrical subjects at college. They were simply well-grounded in mechanical engineering, and the electrical companies to which they went after leaving college taught them what they needed to know about electricity a great deal better than they could have been instructed in college. Give me a man who is well-grounded in the points I have named, and possibly has taken a little chemistry in addition, and in 4 or 5 years, if he has the capacity, I will make a better gas engineer of him than he can be made in any college in the United States.

Mr. J. W. Dunbar (New Albany, Ind.)—As I have not received an advance copy of Mr. Doherty's paper on "Gas Association Work," it is impossible to present an intelligent discussion and to attain by deliberation a correct conception of the conditions confronting Gas Associations and their solution which would permit of unanimity of opinion as to what constitutes concurrent work. Therefore, the best I can offer is a presentation of the subject of association work in general. A thorough knowledge of the thoughts presented by Mr. Doherty with a discussion, by analysis, of the summary of association work presented, would have been desirable and instructive, permitting of a clearer conception of beneficial work required and the possibilities to be obtained. There seems to be a growing sentiment that we have too many associations, composed, as many of them are, of persons who are members of from one to five organizations, with the result of dissipation of energy and the prevention of success to be obtained only by concentration of thought and by efforts to attain an unerring solution of problems affecting our industry, particularly in so far as represented in the manufacture and distribution of our product. I am led to believe that Mr. Doherty is of the opinion there is too much haphazardness in association work with no definite idea or aim in that direction of affairs

and work possible to so large an aggregation of intellegence possessed by the members of the various associations. I believe that Mr. Doherty, to a large extent, has stamped his personality upon the excellent and efficient work now being accomplished in the Ohio Association by securing the active co-operation of its members in collecting invaluable data and recording the same for reference. From a "guess standpoint" of the contents of the paper, I agree with him that the various associations are not accomplishing in work that which should be expected. There is too much of indvidual irresponsibility among members with a lack of a realization of duty due from each to the association to which he belongs. An association is just what its individual members make it; no better, no worse. But as an army could not have crossed the Alps without the inspiring genius of a military captain like Napoleon, and as success would not have been obtained by the Federals on Shiloh battlefield except for the confidence, self-reliance and bulldog tenacity of General Grant never to surrender, so in Association work, while its success depends upon individual effort, the responsibility rests largely with the officers and directors to discharge the duties imposed and accepted. There is no association that could not enlarge its field of action and usefulness, if its officers would perform their duty. That duty consists in faithfulness to a trust, in the mapping out of work, in assigning a part to those not association drones, in encouraging and developing the latent energies of its members and corralling them to the point where every man should recognize that he owes his association the benefit of his experience and research. No one officer, except he be a Hercules, and devoting his time solely to Association work, can inspire its members and infuse them with strenuous energy. Each director or member of council should realize the responsibilities of his office and endeavor to discharge his duty, which duty is to suggest work and assist in its prosecution, and unless he is willing to do this duty he owes to himself and the association which has honored him not to accept such a position of trust. He has no right to the honor attached unless by his effort he makes the office a distinctive award of merit. There are not too many associations, if a campaign of work is inaugurated that will bring into active service the bright minds and the plodders who compose the membership, and this is the duty of the officers—not of one or of two, but of all. It must not be inferred that the associations have not done good work. A review of the New England, American, Western, Pacific Coast, Ohio and other association proceedings which are published will disclose a presentation of invaluable information, both technical and practical. It will also be apparent that little is duplicated, although there is lacking much of definite certainty in conclusions attempted. I am of the opinion that the gas associations of the United States each occupy a field, and my idea of distribution would be one National, several Inter-state and numerous local organizations. Practically just such an arrangement as now exists. There should be more local State organizations, in some instances comprised of two or three States, when local conditions are similar. Many gas company superintendents have duties, detail in their nature, the solution of which is not to be found in large associations, where one loses his personality and has a timidity or modesty in the presentation or the seeking of information on topics which he thinks would make him appear small in the presence of associates. Hence, a large number of smaller associations would find a profitable field for work by bringing into closer touch persons who would have mutual interests, because similar conditions and problems confront them. There is a greater defect of management in smaller than in larger gas companies, due to the environments and conditions that surround a superintendent. His company does not feel able to pay his expenses to large association meetings, and be he ever so capable he is not permitted to acquire by heart to heart talks with his associates that knowledge and insight which, if acquired, would permit of intelligent, progressive and economical management of his small gas plant. To fill this want, more local organizations are needed. At the same time, it should be the aim of the larger associations, especially the Inter-state, to extend its work so as to include problems of detail. The educational work of the American, the "Question Department" of the Ohio, and the "Wrinkle Department" of the Western are all along the right line. As stated before, a perusal of the proceedings of the various associations shows each has a distinctive field, educational and practical. One may consider himself lacking ability and energy if he is not inspired to ambitious efforts by their perusal. I may be pardoned for briefly stating the work being accomplished by the Western Gas Association. First of all, it has been distinctly a paper association. During the last 10 years 80 subjects have been presented at its annual meetings. As to quality they are second, I think, to no other association, although other associations have excelled in different departures. Of the 80 papers presented, 56 have been on different subjects, all important and representative of our industry. The authors who prepared the same were mostly men recognized for their technical, practical and managerial abilities, who gave the association from their fund of knowledge a full measure of their experience. The Western was the first association to make the "Wrinkle Department" a feature of association work, the value of which was so apparent that most associations now recognize this department as being all-important and have their own wrinkle editors. During the past year, the Western Gas Association, through its editor, William E. Steinwedell, completed, published and furnished, free to its members, a volume of 350 pages containing the wrinkles presented at all association meetings for the years 1890 to 1900, inclusive, and expect to publish an additional volume containing all down to date. A few years ago it was determined to publish in book form all of its proceedings. During the last few months the fourth volume, for the years 1898 to 1902, inclusive, edited under the supervision of Mr. O. O. Thwing, its present Vice-President, was published and furnished to each member. The gas exhibit of the Louisiana Purchase Exposition is the result of the Western Association's enterprise, the credit of which is due to its president, Mr. F. H. Shelton. The "Card Index of Gas Literature," the first collection of which was issued since its last meeting, is an almost invaluable aid to gas engineers for matters of reference. Subscriptions amounting to $5,000 or $6,000 were secured through the efforts of the Secretary, the work of issue being under the direction of Mr. Shelton. This Congress of all American Gas Associations is the result of a movement inaugurated by the President of the Western Association. Reference was made above laudatory of papers read at the different meetings of the Western. While all writers at the meeting belong to the American, Ohio and Western Associations, yet individually the majority of these paper writers have thrown their best efforts in the line of association work and are best known as members of the Western. Its meeting this year has been practically abandoned in the interest of this Gas Congress, evincing a spirit of largeness in the development of the whole fraternity in making its own meeting of secondary importance. With the present gas association of America there might be a conference committee appointed for the directing of work along different lines, when deemed expedient, so as to have each association employed in some field for research. Fundamental truth and facts are wanted, and each association as a result of conference might do special work under directions from a committee as suggested. But, above all, each association will be progressive and useful just to the extent that its officers realize their full responsibility and to the extent that they succeed in inducing its members to work for the Association's advancement along lines of progress, appreciating the fact through work their own capacity for usefulness will be enhanced, and they will thereby reap the result of their labor. Duty in small things characterizes the man. Duty performed brings peace and happiness, and in the discharge of our individual duty to the association to which we belong let us bear in mind this verse from the "Village Blacksmith," applicable to each of us in our several stations in life:

"Toiling, rejoicing, sorrowing,
Onward through life he goes,
Each morning finds some task begun,
Each evening sees it close.
Something attempted, something done,
Has earned a night's repose."

Mr. A. K. Stiles, Streator, Ills.—I am here as a listener, am a member of the Western Gas Association and am very much pleased with the part contributed by Mr. Dunbar to the discussion on the paper by Mr. Doherty. My experience in the lighting business began in the early days, before the formation of the National Electric Light Association. I paid the expenses and my clerk sent out all the notices for gathering the electricians from all over the country to form the National Electric Light Association, some 20 years ago. In that case the National Association was formed before the local associations. In this case the local associations were formed first. I have had something to do with association work in a great many fields, have been president of a number of companies engaged in different kinds of business—one of them was the wire business in the early days. I am inclined to think that the best way is to have a national body and then have a State association for each State, as this plan has proved very successful in the electric lighting and other business. We have local laws in each State applying to this business and the plan of a national association and also State associations has worked out all right. I think if it can be done, it is best to have only one national gas association, and then a gas association for each State or two or three States;

that would be for the best interests of all the gas men in the country. These State associations would be accessories and helpers to the national association which we have voted to form. Besides being a helper to the national association, the State associations could look after the local interests of their members and also the local laws. I heartily agree with the plan of Mr. Doherty for the formation of one representative national gas association.

The President (Mr. Pratt—As the time allotted for the discussion of this paper is very short, we must be as brief as possible. It will be necessary to limit the balance of the discussion to 3 minutes for each speaker.

Mr. Paul Doty, St. Paul, Minn.—I want to say that to-day is a psychological moment—a child is not born to-day, but a child is conceived to-day, and undoubtedly the paternity of that child will be laid to Mr. Doherty's door. I want to make a plea for the biggest family possible. The scope of the gas business, as Mr. Doherty gives it, is manufacturing, transporting, collecting, investing, mercantile and development. Mr. Doherty suggests that the new association which will be formed be called the American Institute of Gas Engineers and Managers. I think the name is weak. In the first place it needs to be collective in order to explain the idea he presents. I think the use of the term Gas Engineers and Managers would possibly create a class distinction. We must avoid in the new grand national association any class distinctions. If the business be a collection business it will include auditors or commercial men, the secretaries and treasurers; if it is to be an investment business it will require bankers; if it is to be a mercantile business it will require salesmen; if it is to be a development business it will require new business managers. Therefore, I recommend to the committee who will aid in the birth of this child that the name of the child be "The American Association for the Advancement of Gas," and not limit ourselves to a name that would indicate a class of gas engineers.

Mr. Stiles—As I understand it, that will all be left to the committee. If I were going to suggest a name I would say the American Gas Association.

Mr. J. M. Berkley, Bloomington, Ills.—Is it the intention to amalgamate all the gas associations into one association and do away with the present local associations throughout the United States?

Mr. Boardman—A committee has been appointed for the purpose of considering that and taking such action as may be deemed advisable.

Mr. Berkley—I beg leave to say to the committee if this is done you will destroy the grandest and noblest method of education we have, aside from the Trustees' Educational Fund, if you wipe out the existence of the local organizations; for where will the small men be in the larger association generalized under one head? Take a word of warning from Mr. Dunbar on the Ohio river, who correctly interprets the sentiment of the young men in all of the associations.

Mr. H. L. Doherty, New York—I call the gentleman's attention to the point that if he had been here when I read the paper he would have learned that local sections are provided for. As a matter of personal privilege I want to say that Mr. Shelton anticipated this subject by taking it up in the Western meeting yesterday. There are certain things I would have liked to have replied to which Mr. Shelton advanced, but considered it was not wise to reply to them in the Western meeting, as it would anticipate discussion here, and here is the place to discuss this subject.

Mr. F. H. Shelton—I want to lay at the footstool upon which Mr. Doherty is about to be confined the tribute of my personal admiration for the magnificent way in which he has handled the subject. I was a little fearful that my remarks in the presidential address before the Western Association, using the Ohio Association as an illustration, might be misconstrued into a somewhat unnecessary criticism upon that Association. Mr. Doherty is broad enough to know, and I think most of you realize, that the remarks were made to illustrate the fact that splendid and magnificent energy was being exercised in the Ohio Association for the benefit of 200 or 300 men only, and not for the benefit of 2,000 men, who ought to have the advantages which result from such energetic and splendid work. I was particularly glad to see Mr. Doherty put on the committee to act on the president's address, because I knew he would reply and take it up in the broad spirit in which he has. My remarks on this subject the day before yesterday were condensed. I have not had the time to elaborate a scheme of a union of all associations. Mr. Doherty has not had the time either, but nevertheless has done it! How he has done all this hard work is beyond me, and I know something of what hard work is. I admire him for the work he has done, being requested at the last minute and with short notice to prepare a paper on gas association work, and in being able to prepare a paper 33 pages in length, and he does not say the same thing twice (to any extent) throughout the paper. We may differ in details, we may differ on the value of college education, and we may differ as to some things contained in Mr. Doherty's paper; but I think we all agree in the general and lasting value of the ideas which Mr. Doherty gives us. Mr. Miller says we were painted a little too black. I have no doubt that we were painted a bit black purposely, to stir us up, so that we could get at the facts. It is a good way to bring out the best results. Mr. Doherty has studied the question and considered it for several years, and whatever the details may be of any ultimate plan of union, I feel confident the essentials, the backbone and dominating features, will be found largely those embraced in the suggestive paper which Mr. Doherty has offered. Nothing of value is made in a day. It takes time to work these things out, and I think we can leave this hall in the feeling that the biggest work and the greatest thing accomplished by this Congress of Gas Associations is the beginning of a plan which will ultimately ripen into an organization bringing together in one body all the gas men in the country. We will do it, gentlemen. The time is much nearer when it will be done than I had dared to believe a few weeks ago. I was delighted to see the resolutions offered by Mr. McDonald adopted unanimously and without the slightest evidence of any disapproval of the scheme. We can leave here feeling that the committee which will be appointed by the various presidents will be composed of men of the best judgment, ability, knowledge, enthusiasm and interest in gas association work, and that they will safely take care of the trust which will be reposed in them. I feel, in view of such results, that Mr. Doherty's paper is a steppingstone to a greater union, to a greater field, for all gas men in the future. That being the case, I feel that Mr. Doherty will look back on this occasion with far greater gratification and far more pleasure than he will derive from any vote of thanks which may be passed to him. It will be good work, well done, in which his paper will be the chief corner stone, and I think the future will bear me out in these remarks. Gentlemen, I wish as a close to this discussion, as time is speeding on, to move a vote of thanks—carrying the vein of thought I have tried to express—to Mr. Doherty for his sincere effort to improve and unify the condition of the gas associations of this country. [Seconded and adopted.]

The President (Mr. Pratt)—Mr. Doherty, you have the thanks of the Association as expressed in the motion just passed.

Mr. Doherty—Gentlemen, I thank you. I desire to state that the summary of these statistics will be published with the paper, and then you can get some idea of the distribution of association membership, and the total membership at present compared with the possible membership. There are perhaps 1,700 members in the various gas associations and there ought to be 7,000. There are about 1,400 natural and artificial gas companies in this country, and it seems to me that an average of five officers and employees as members of the new Association would not be too much to expect. As to the resolutions that were passed upon the motion of Mr. McDonald, we must remember that associations are formed for results. What we want are the best results obtainable in our associated work, whether there are 10 associations or 1 association, and while I think we do not all believe that the best results can be obtained from one association, at the same time we have got to do something better than we are doing now. Many of us believe, however, that one association will realize greater benefits in our work than if our efforts are scattered among several associations. Mr. Alten S. Miller makes several points, and I do not know that I agree with him. He simply pleads "Not guilty" to the charges I make. The inference is that the gas engineer of to-day is perfect. If he is, we had better abandon our associations as there is nothing much for us to do. On the other hand, I believe every word I have said in this paper. I believe the gas engineer is backward. It may not be in the line of good policy for me to say that, but we must be truthful with ourselves. In no case did I ask for standardization of a particular thing. It was not my intention to do so, and if I did so it was a mistranscription. I am only asking for standard methods of testing and of measuring results—things of that kind which are recognized in all engineering societies, such as the American Society of Mechanical Engineers, of which I believe Mr. Miller is a member. Mr. Miller raised a point about a special steam and street railway engineering course. There are special railway engineering courses, but all of our railway engineering divides itself up into the older recognized engineering courses and does it very naturally, and no other sort of provision would be possible. There are also special courses in street railway engineering. Almost every college which teaches electrical engineering has a special course in street railway engineering, and some particular professor who makes a specialty of the street railway engineering course. Mr. Miller makes the point that we may have 10 or 12 standard ranges,

and that each one may be as good as another, and he says that we should not standardize any one of these ranges. I make the point that while we may have 10 or 12 standard ranges, not one is as good as it ought to be. By inference, Mr. Miller's point goes to the extent of saying that we should be satisfied with what we have. Mr. Forstall's remarks on education, I am afraid, were made believing that he was not in harmony with me, when in truth he merely expressed himself better than I did. I am not the student of English that Mr. Forstall described and lays great stress upon. Perhaps he was able to state in a more direct way what I was trying to cover. My idea is that our progress toward education should be a tendency toward a course producing engineers of energetics and specialties on these lines. I believe specializing should be done before the student leaves college and goes into gas works where his duties become largely routine. Forty men can be taught better and more satisfactorily in college than one man can be taught in a gas works. A gas works cannot be a training school for students, and it is not possible to provide the students with the necessary literature and laboratories. In my opinion the good engineer must primarily be a physicist and mathematician—if he is a thorough physicist and an able mathematician he is virtually an engineer if he has the engineering instinct. I think, as Mr. Forstall does, that we specialize too much; or, rather, I would put it this way—that in our college courses we do not distinguish between facts and truths, between laws and miscellaneous information, and it is important that any educational work should be developed on these lines. Mr. Dunbar tells of the excellent work of the Western Gas Association, which no one will deny, and yet in spite of that the work of the Western Gas Association might have been better, and I say that as a member of the Western Gas Association, and understand that I have recently been elected an officer of that Association. I am ready to contribute to the work of the Western or any other other association as my time will permit. Mr. Shelton touched on association work very largely in his paper of the day before yesterday, and I think in justice to this discussion some reply should be made to his comments. First, I want to thank Mr. Shelton for the compliment he paid me a few moments ago, and I thank him sincerely for it. I also wish to commend Mr. Shelton for the fearless way in which he treated the subject, and particularly his reference to the Ohio Gas Light Association, but in his argument he left certain wrong impressions which might lead his hearers astray. He gave the impression, at first, that the Ohio Gas Light Association was ambitious to be the third in place in the race for national prominence. The Ohio Gas Light Association does not take that position; it has a greater ambition. I am speaking now for a lot of young men who have frequently met and discussed the problems of the gas business. Their progress means that there are many men in that Association who have felt that for the last 5 years American gas association work has not been what it should be, and they started out to do more through the instrumentality of the Ohio Association than has been before accomplished, and their idea was that by example they would create an unusual standard of association work, and make the Ohio Association of more importance, not only to the members of the Ohio Gas Light Association, but to the members of the entire fraternity. As Mr. Shelton knows, the members in attendance at the meetings of the Ohio Gas Light Association during the past 3 years have seldom been much under 200 in number. It is also a fact that at the last meeting there were only 68 railroad certificates presented, because it was the first time that a reduced railroad fare had been granted for the convention; but the impression was given by the statement that there were only 68 railroad certificates presented by the delegates, that there were only 68 members in attendance. The truth is that for the past 3 years there have been over 200 members in attendance at each meeting. Mr. Shelton also gave the impression that the Ohio Gas Light Association was working for the benefit of its members only. Some of the publications of that Association, the Question Box particularly, have been sent to every American gas company, whether a member of the Association or not, and the expense has been borne by the Ohio Gas Light Association. I think they deserve credit for taking down the bars and saying that if they can do any good work it will be for the common good of the entire gas fraternity. I also think that great credit is due to the *Progressive Age* for its index of gas literature. I think it deserves some recognition, so that it will be encouraged to continue this work.

The President (Mr. Pratt)—I think Mr. Doherty understands he has the thanks of the Congress for the paper which he has presented and that the discussion on this paper is closed.

Mr. Doherty—I appreciate the vote of thanks which has been passed by the Congress.

MISCELLANEOUS.

The Secretary then made announcement regarding the banquet, and also regarding an invitation to visit "Fair Japan," which was accepted.

Mr. W. A. Learned, Newton, Mass.—Mr. Chairman and Gentlemen: I am requested by Mr. W. R. Addicks, of New York, to present the following to this Congress:

To the Gas Congress—As a delegate to the Gas Congress, and as an active member of 6 gas associations—to wit, the American, the Guild of Gas Managers of New England, the New England, the Ohio, the Western and the Society of Gas Lighting, all represented at this Congress—I desire to present the following resolutions for your consideration and approval:

Resolved, That evidence accumulates showing the absolute necessity of concerted action on matters of importance to gas and electric associations and the interests they represent, and requiring the co-operation of the gas fraternity and allied interests;

Resolved, That the time has arrived when a new movement should be inaugurated;

Resolved, That a permanent organization of the associations represented in this Congress be and hereby is formed under the name of "The Gas and Electric Lighting and Railway Associations' League," and to have as its members the respective presidents and first vice-presidents and secretaries (all ex-officio) of every association represented in this Congress, and to meet at least once in each year, or upon call of the secretary or chairman chosen by the League;

Resolved, That said members formulate constitution and by-laws for the government of said League;

Resolved, That said members take action looking to the indorsement of this act by the Gas Congress at the next succeeding annual meeting of the several associations represented in the Gas Congress.

Chairman Pratt—Gentlemen, you have heard the resolution presented.

Mr. A. E. Boardman, New York—I think had Mr. Addicks been present, he would not have presented those resolutions, feeling that the work he wishes to have done has so far progressed in the direction he would like that he would deem it superfluous to offer the resolutions. Not being here, of course his friend presents the resolutions, and I do not think it would be a discourtesy to print them without further action, because there are some matters that might conflict with the resolutions which we have already passed; hence I would move you, sir, that the resolutions be printed for information, and that they be referred to the committee which has already been provided for.

Mr. H. L. Doherty—Would it not be well to find out what Mr. Addicks' representative here had in mind, or whether he knows what Mr. Addicks' idea is. I am inclined to think Mr. Addicks had in mind what many men operating quasi-public corporations have been impressed with during the last four years. We are in a peculiar position regarding rates and taxes, and it is one of the hardest problems for us to solve. On account of the peculiar laws in many places we are compelled to pay more than our just share of taxes if we put the value of our property in at a high point. If we put the property in at a low point we are liable not to get fair and remunerative rates. We are in the peculiar position of claiming high valuation for one purpose and low valuation for another purpose, and the matter should be taken up by the quasi-public corporations of this country, so as to bring about some reform in the methods of taxation.

Mr. Learned—I have no further information from Mr. Addicks in regard to this matter other than is contained in the resolutions. He requests me to present them to the Congress.

Mr. Doherty—Then I would amend Mr. Boardman's motion, so as to give the committee some power in the matter. Mr. Boardman's motion provides for referring the resolutions to the committee, but gives them no power to act.

Mr. Boardman—In my opinion they have such power; but if it is thought necessary to add that to the motion in referring the resolutions to the committee, giving them power to act on the subject, I would suggest such an amendment—they will have in any event power to make such a recommendation as they consider desirable. [Mr. Boardman's motion was carried.]

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

The President (Mr. Pratt)—Is the committee on Mr. Norris's address ready to report?

Mr. Boardman—Mr. Chairman and Gentlemen: The committee on the address of Mr. Norris respectfully presents the following report:

To the Congress of American Gas Associations: Gentlemen: Your committee, to whom was referred the opening address of Mr. Rollin Norris, heartily recommends to you a careful reading and consideration

of the admirable contribution to the proceedings of gas associations here represented.

There is much in this initiatory address that deserves more than passing mention, and while it contains no specific recommen lation r quiring definite action by this committee, and while your committee is impressed with the thought that although such an address is not usually a subject for discussion, yet because several members have expressed a desire to discuss some of the questions raised, and features considered, your committee recommends that this address be published in advance of the proceedings of the Congress and that a copy be mailed to each delegate, and that 15 days be allowed in which discussions may be mailed to the Secretary, that the address, together with the discussions thereon, be made a part of the proceedings of this Congress.

Respectfully, EDWARD G. PRATT, ARTHUR E. BOARDMAN, } Committee.

On motion of Mr. G. G. Ramsdell the report of the committee was adopted as read.

(To be Continued.)

The Luchaire-Lecomte Gas Regulator.[1]

[A paper read by M. LECOMTE before the Societe Technique du Gaz en France.]

The introduction of a device for regulating the consumption of gas at the burner was due to Boivin, in 1840; but Babton and Giroud improved his original idea. The former devised the tubular valve, to remove (almost completely) the excess of upward pressure; and the latter was the first to construct a tiny regulator with a bell standing on a seal filled with glycerine. The Lecomte bunsen described at the congress of the Society in 1898 was fitted with a dry regulator with an aluminum valve of special construction; and an experience of some 100,000 of these instruments has made prominent their merits as well as defects. The glycerine regulators, though accurate, non-choking, and adjustable to very small consumptions, possess one serious drawback—viz., the glycerine. Under certain circumstances, this evaporates; and in the case of an installation under examination for a considerable time, it was possible to trace the rationale of this evaporation. At the end of a month, sometimes sooner, the regulator leaks. On removing it, drops of glycerine are found in the gas supply pipe; and if the regulators are unscrewed, more liquid is found than was placed therein. This state of things arises from the condensation which takes place when the burner is extinguished. Tiny drops of water dissolve in the glycerine, and when, after a time, this substance has been diluted up to a certain point, it evaporates, leaving the bell dry.

Dry regulators do not possess this defect; but they have other disadvantages. The aluminum valve in the Lecomte bunsen absorbed 5.25 mm. of water pressure. If the apparatus is to be adjusted to a small consumption, there must be very little play between the valve and the walls of the chamber; but then the least bit of dirt blocks the valve. If, on the other hand, the play is made greater, the regulator is useless for small consumptions. Also variations of volume take place, due to the fact that the valve, if it does not remain in the center of the cylinder, alters the conditions of flow in consequence of the variation in the co-efficient of contraction. Another drawback to the dry valve has been noted by M. Darlu de Roissy. It is that if the gas is not perfectly purified, or if it has taken up dust or moisture, the lower cover of the valve acts like a condenser plate, and the deposited impurities soon choke the instrument.

To be as nearly perfect as possible, the regulator should comply with the following conditions: (1) The consumption should not vary, however the pressure may vary. (2) It should absorb little pressure. (3) It should not get out of order. (4) It should not become blocked. (5) It should be adjustable for small consumptions. In the Luchaire-Lecomte regulator an attempt is made to combine these qualities in one instrument by adopting a new method of construction. The apparatus, shown in section in Fig. 1, consists of four parts—the base *A*, the cover *B*, the guide piece *C* (fixed to the base), and the regulating bell *D*, in which are an annular valve *E* and apertures *F*. The base carries a thread for the gas supply pipe. The cover has two threads—one (*G*) screwing directly into the bunsen burner, the other (*H*) into the ejector of the burner. Constancy of consumption is guaranteed by the annular valve, which permits the pressure to act above and below without the passing of the gas between the edge of the valve and the top of the cover acting on the weight of the bell. As there are apertures in the bell, it is necessary to open the regulator and manipulate it with a tool in order to change the consumption. The guide piece *C* is chiefly used to prevent the passage of gas from the lower to the upper part of the bell, and to reduce the pressure of the direct stream of gas at the outlet. The weight of the bell is only 2.2 grammes; its diameter, 24 mm. (0.96 inch), and it takes up 4.8 mm. of pressure; but as the valve is heavy, a force of 2.2 grammes would be required to depress it if it is arrested in its descent by a particle of dust. But, on the other hand, if the obstruction took place at the lower limit of its movement, the gas pressure, for only one centimeter of water pressure, would have to exert a force of 4.5 grammes in order to disengage it. To prevent dust, drops of water or tar, fragments of naphthaline and so forth, from entering the regulator, the gaseous current is broken up by the guide plate of the valve, on which these substances deposit.

The novel part of the regulator consists in the grooves in the interior. As already stated, there must be a small space between the valve and the walls of the regulator in cases of limited consumption. The bell of the Luchaire-Lecomte regulator is placed at the center of the chamber, with a play of 0.5 mm. for the inside, and the same distance for the outside diameter. To obtain an idea of the size of the passage thus offered to the gas, we may think of the inside play as equivalent to a tube 12 mm. high and 6.7 mm. internal diameter, and of the outside play as of a tube 12 mm. high and 7 mm. internal diameter. And yet through this area only 25 liters (0.88 cubic foot) of gas passes unless the bell is pierced. The gas circulating around the bell should lose pressure equal to the weight of the bell—say, 5 mm. At first the gas passes in thin layers between two extended surfaces—a state of things conducing to loss of pressure. Afterwards, in its passage, it fills each of the grooves, and it will be understood that the temporary halts, the eddies, and other movements involved, almost completely reduce the speed of circulation of the gas, and the whole of it passes by way of the regulating aperture. The current of gas circulating round the bell maintains a constant volume, whatever the pressure as determined by the weight of the bell. The latter is kept central by the pressure of the gas.

As examples of applications of the new regulator may be instanced an ordinary bunsen (Fig. 2) which it is desired to keep as short as possible. The extra height of the regulator is only 23 mm. Fig. 3 shows the regulator fitted to a No. 3 Luchaire low pressure burner working at 25 mm. In Fig. 4 the regulator is shown in use on a No. 2 town burner working at 20 mm., and giving a light of 90 decimal candle

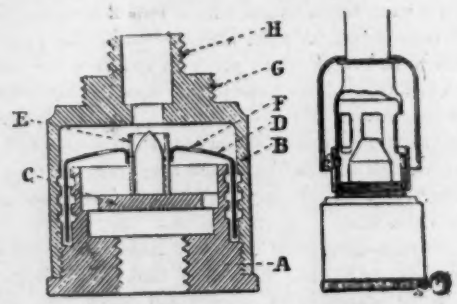

Fig. 1.

Fig. 2.

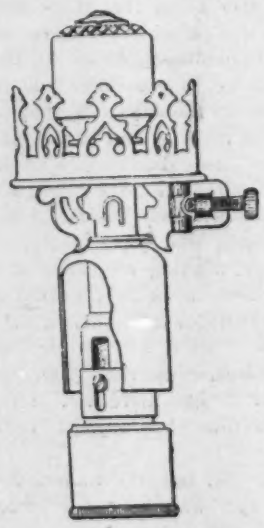

Fig. 3.

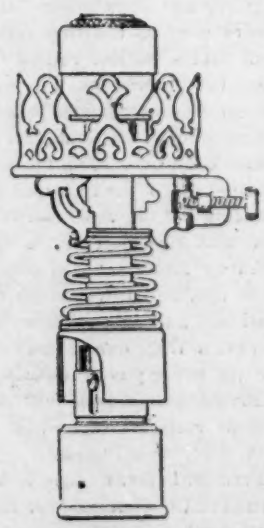

Fig. 4.

1. Translated for the *Journal o Gas Lighting.*

power for a consnmption of 115 liters (4 cubic feet) of gas. The new regulator will also replace that hiterto used in the Lecomte burner which will thus be able to work (in the No. 2 size) at pressures from 10 mm. The results obtained with a low pressure bunsen burner in 1898 —1 carcel hour with 11.7 liters at 10 mm. pressure—for which a prize of 500 francs was awarded to the author on the report of M. Vautier, have not yet been surpassed.

Internal Combustion Engines and the Diesel Principle.

Mr. W. H. Booth, writing in the *Electrical Review*, says it is a pity that in his James Forrest lecture Mr. Dugald Clerk should apparently have confined his remarks so much to those engines which are of home origin, because by doing so he omitted much reference to such engines as the Korting, which owes its success to a system of working, the credit of which belongs to Mr. Clerk, and to the Diesel engine, which stands out from all others as the outcome of the latest ideas to internal combustion motors.

It has been pretty conclusively shown that economy in the gas engine attends on high compression, but practice has shown equally conclusively that high compression of an explosive mixture has a low safe limit.

The compression of a gas requires the expenditure of energy, and this energy in the case of a perfect gas is converted entirely into heat energy, and manifests itself by rise of temperature. In a slowly running engine much of this heat could and would pass into the water jacket, and so far would be lost for useful work in the engine. Compressed quickly, as it must be in any engine of moderate size per unit of effort, the gaseous mixture becomes heated to a high temperature and becomes spontaneously explosive. Myself, I have little doubt that spontaneous ignition takes place more readily in the more highly hydrogeneous mixtures, and this very real danger shuts out from high compression use the richer gases; and those with much hydrogen in their composition, such as the water gases and the coal gases, are unsuitable to be employed in high compression engines.

Mr. Thwaite, in his blast furnace gas practice, has found that the very poor gas produced from a blast furnace, and containing very little hydrogen, is a very manageable gas. This may partly be due to its considerable constituent of carbon dioxide, which assists to delay ignition. Suffice it to say, that blast furnace gas will safely endure an intensity of compression above what can be secured with richer and hydrogeneous gas.

Now, in the Diesel engine, compression is entirely independent of the quality of the fuel, for the very simple reason that no fuel is introduced until it is wanted to ignite. Pure air alone is compressed, and, therefore, the intensity of compression is limited only by two factors—the ability of the mechanical construction to withstand the stresses, and the thermal possibilities involved. The high compression produces a temperature sufficient to cause ignition of the fuel, and this ignition takes place as soon as the fuel is introduced to the heated atmosphere in which it burns.

Thus the Diesel engine does act along very different lines from those casual lines of the ordinary internal combustion motor. Though the full cycle intended to be worked by Diesel has not been found practicable, a part of it has been secured, and combustion takes place on isothermal lines, the diagram of the Diesel engine being simply the compression curve pushed forward by temperature, so that the air occupies a larger volume at the same pressure. Thermally, the advantage of this system is that the maximum pressure may be employed that the machinery will permit, and there can be no pre-ignition. There is no sudden accession of pressure on the dead point, but the pressure may even rise a little after the crank has passed its position of zero effort. In this way, therefore, there is less mechanical loss incurred through the imposition of a heavy pressure on the bearings during the time such psessure is producing no turning effort. Where early ignition takes place and produces this effect, much of the heat is passed directly to the water jacket and therefore wasted.

In gas and oil engine work it is of importance that the heat generated by combustion should pass very directly into mechanical work. Every engine is, of course, a compromise between full ignition on the dead point and the longest utilization of the pressure produced, and prolonged combustion, with a minimum of loss to the jacket. Early and complete ignition not only produces frictional loss but jacket loss. These losses are both saved by prolonged combustion, which by purely academic men is looked on as error. Hence the importance of securing a satisfactory compromise. In the Diesel system this compromise, combined with the principle involved, enables an efficiency to be obtained as between indicated horse power and calorific capacity of the fuel of 42, if not 44 per cent., and well over 30 per cent. can safely be counted on, referred to brake horse power.

There is an impression abroad that the mechanical efficiency of all internal combustion engines is low. This is not strictly true as very commonly understood, and it only arises because so many revolutions are made for one working stroke, which has to carry all the frictional effects of idle stroke.

As a machine, the Diesel or other engine may be fully as frictionless as a steam engine, and recent tests of a Diesel engine have shown me that this is the case. I have also found that an indicated horse power hour can be got for about 0.32 pound of crude oil with a calorific capacity of about 19,000 B.T.U., and this points to a very efficient utilization of the heat value of the fuel. This high efficiency is a result due largely, of course, to the high compression which is possible only with the Diesel system of fuel admission. It is also partly due to diminished friction and diminished jacket losses referred to, and these advantages may be more or less secured in other forms of engines than the Diesel.

The economies of recent years in internal combustion engines have all tended towards a diminution of jacket losses. Diesel originally hoped to cut off jacket losses altogether, but this has not been proved possible in practice. A very high piston velocity that would diminish the duration of the heat absorption of the jacket and accelerate the conversion of heat into work, would render the jacket dispensable, but these factors are not yet secured to the necessary extent.

The future improvement of internal combustion engines lies so much along the lines followed by Diesel that this motor may be studied to good advantage, for its system of compression removes the most serious limitations of the ordinary engine, and in weight of combustible per unit of energy output its record is far ahead of any other motor.

The Origin of Anthracite.

By a Fellow of the Geological Society, in *Engineering*.

Of the many problems which coal presents to the mind of the geologist, perhaps there is none more difficult (or more fascinating) than the endeavor to explain why it occurs in so many different forms. That it is of vegetable origin is admitted; but while some coals are closely allied in exact chemical composition to wood itself, other varieties consist of practically nothing but pure carbon. For instance, cannel coal contains 66.4 per cent. of carbon and about 18 per cent. of oxygen, nitrogen and hydrogen, while anthracite, or steam coal, contains about 92 per cent. of carbon and only 6 per cent. of the above gases. How has this change been effected?

It is obvious that the change from cannel to anthracite could be brought about by some process of destructive distillation, for the volatile components of coal are driven off every day in the form of gas from the retort of the gas works. It is with knowledge of this fact that the geologist must set himself to explain the occurrence of anthracite in some districts—anthracite which belongs to the same geological epoch as all the other forms of coal.

In the course of his evidence before the Royal Commission, Mr. John Roberts has recently dwelt upon some of the features presented by seams of anthracite, and he has epitomized the different theories which have been put forward to explain the process of anthracitization. It is passing strange that there should be more than one theory necessary to explain the phenomena; but "the testimony of the rocks" makes it impossible to account for the occurrence of anthracite by saying that it is merely coal which has been subjected to metamorphism in the bowels of the earth.

In some districts, of course, as in South Wales, all the coal seems to have been subjected to the same influence. During the countless ages which have elapsed since the coal forests grew and flourished, the Welsh seams appear to have been subjected not only to the enormous pressure of superincumbent rocks, but to the internal heat of the earth. In such conditions, the driving off of the volatile constituents can be easily understood.

Composite coal fields, however, present features which demand some other explanation. Thus it is sometimes found that anthracite seams below pass upwards into steam and bituminous coals above; while in the Creusot district in France there is an anthracite bed with bituminous coal seams both above and below. It is this last phenomenon which upsets the explanation that anthracitization is caused by regional metamorphism.

The carbon dioxide (choke damp) of old coal mines and the carburet-

ted hydrogen (fire-damp CH_4) given off in such large quantities by coal seams are products of the alteration which would appear to be accelerated by terrestrial movements, such as those that compress and plicate rocks. During the process these gases escape, and the proportion of carbon progressively increases in the residue till it reaches the most highly mineralized anthracite, or may even pass into nearly pure carbon or graphite.

In the coal basins of Mons and Valenciennes the same seams which are in the state of bituminous coal (gras) at the surface, gradually lose their volatile constituents as they are traced downward till they pass into anthracite. In the Pennsylvania coal fields the coals become more anthracite as they are followed into the eastern region, where the rocks have undergone great plication, and where possibly during the subterranean movements they were exposed to an elevation of temperature. Daubree has produced from wood exposed to the action of superheated water, drop-like globules of anthracite, which had evidently been melted in the transformation, and which presented a close resemblance to the anthracite of some mineral veins. It has also been stated that part of the framework below a steam hammer has been found after 20 years to be converted into lignite.

Hirschwald says that wood sheltered from the atmosphere and exposed to the action of water, especially with an increase of temperature and under some pressure, may be converted into lignite and coal. An example of this alteration has been observed in the Dorothea mine, Clausthal. Some of the timber in a long disused level filled with slate rubbish, and saturated with the mine water from decomposing pyrites, was found to have a leathery consistence when wet; but on exposure to the air it hardened to a firm and ordinary brown coal, with the typical brown color and external fibrous structure, and having the internal fracture of a black glossy pitch coal. This change must have been produced within less than four centuries—the time since the levels were opened. The transition from lignite to anthracite by the gradual removal of the oxygen is shown in the following table:

	Lignite.	Earthy Cannel Coal.	Splint Coal.	Caking Coal.	Anthracite.
Carbon.....	65.3	66.4	75.58	84.28	91.44
Hydrogen....	6.6	7.54	5.50	5.52	3.46
Oxygen. }	25.3	10.84	8.33	6.22	2.58
Nitrogen }		1.86	1.13	2.07	0.21
Ash.....	2.1	13.82	5.46	1.89	2.31

What is known as local anthracitization may be capable of easy explanation. Thus the proximity of igneous rocks, whether as laccolites or as intrusive veins, may be sufficient to account for the total absence of volatile constituents from coal seams. Thus, in the Slammanan district of Stirlingshire the presence of anthracite may be explained by the existence of a large intrusive mass of whinstone beneath and parallel to the coal seams. Again, at the Fixsterngrube, near Altwasser, in Lower Silesia, a bed of coal is partly covered by a large mass of quartz porphyry, and is then locally converted into anthracite, the part uncovered by the igneous rock retaining its ordinary bituminous character.

Enough has been said to show that heat and pressure alone are scarcely sufficient to account for the occurrence of anthracite. Perhaps the combination of these two agencies far below the surface of the earth is sufficient. Professor Miall, however, has drawn attention to another fact of interest in relation to coal. It is that some coals lose a large proportion of their volatile components when exposed to the air. Thus he found that the "Bethr Bed" coal loses in the space of two months, on exposure to air at ordinary temperatures, as much as 17 per cent. of volatile matter.

Having regard to the difficulty which besets the reconciliation of all these theories, it seems that we must be content to assign more than one cause to the formation of anthracite.

A Coal Screening Plant.[1]

In his recent evidence before the Royal Commission on Coal Supplies, Colonel Sadler stated an incontrovertible fact, when he laid it down that coals may very often be greatly improved by the simple process of "picking." The coal to be submitted to this operation, as is very well known, is carried on a travelling belt, which should be of ample length, and well lit from the roof. Operatives standing on each side of the belt, at short distances, pick out the stone, shale and other foreign substances as the coal passes along. The contract for a complete screening plant—including picking belts, with jigging screens, revolving tippler, and various conveyors, together with the necessary steel structural work and gearing—has recently been concluded between the Mirfield Colliery Company, of Ravensthorpe, and Messrs. Graham, Morton & Co., and a brief description may be of interest.

Commencing with the revolving tippler, this is of the latest type, with a diameter of 6 feet 6 inches. It is arranged to convey the whole of the coal from the tubs to the screens without waste, and to reduce the breakage to a minimum. The rims are of cast iron, firmly stayed by 1-inch diameter tie bolts. The rails inside the tippler are formed of 3½-inch angles, and are provided with a steel plate shoot, for delivering the coal on to the jigging screen. Driven from the jigging screen by cast iron sprocket wheels is the distributing roller, itself of cast iron, and mounted on a 2-inch diameter shaft. The jigging screen is fitted with plate meshes, so arranged in themselves as to vary the size of the mesh as desired.

The jigger sorts into three classes of coal—smudge, nuts and best. The length of the jigging screen is 18 feet 6 inches, and the width 5 feet. The primary screen has a screening surface of 65½ square feet, and is composed of 1½-inch diameter holes, set closely together. The secondary screen has a screening surface of 45½ square feet, composed of ½-inch diameter holes, likewise set closely together. The fittings for driviug the screen consist of two 5-inch travel eccentrics, mounted on a 3-inch diameter shaft, provided with pedestals and loose collars. On the under side of the jigging screen are two steel plate shoots, for delivering the nuts and slack to the picking belts.

There are three belts, arranged to convey the coal to the trucks, with lowering shoots at the end. The nut belt has a hopper arranged for taking coals from the belt to cart or corve. Two hoppers are supplied to the "best" belt, and the coal, hand picked or unpicked, can be taken by carts. The whole of the hoppers are supplied with traps and levers, and are easily opened and shut as required. No. 1 picking belt is 4 feet wide, with 58 feet centers; No. 2, 3 feet wide, 50 feet centers; and No. 3, 3 feet wide, 40 feet centers.

Each of the conveyors consists of a lattice braced framework, built up of angle iron stanchions, and completely cross braced by means of flat bars. The standard driving and trailing end fittings consist of 24-inch diameter cast iron hexagonal drums, and mounted on 3½-inch diameter steel shafts. Each conveyor is supplied with two strands of 12-inch pitch cast steel chain; and to each pair of links—one on either strand—are firmly bolted the ½-inch pressed steel plates—the trays and chains being supported by means of 6-inch diameter cast iron rollers, mounted on 1¼-inch diameter steel shafts. At the end of each conveyor are three steel plate shoots, for delivering the material into the wagons. And here a word as to the creeper, which conveys the coal to the revolving tippler. It is of 23 feet centers complete, and consists of end fittings, one strand of chain, and the necessary steel trough for supporting the chain. The end drums are of 24 inches diameter, mounted on 3-inch diameter steel shafts. The plant is designed to deal with an output of 500 tons per day.

1. *Journal of Gas Lighting.*

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. W. H. Vollum, formerly Assistant Manager of the New Orleans (La.) Lighting Company, has been named as assistant to Mr. J. D. Shattuck, Manager of the Suburban Gas Company, Chester, Pa. Mr. Vollum's title is that of General Superintendent.

Some of the advertisements (in fact, many of them) published on a large scale in the St. Paul (Minn.) daily newspapers by the St. Paul Gas Company, respecting the advantages of gas as a cooking agent, are well worth reading. Their statement is especially true of the ad. printed on such account in the St. Paul *Daily News*, dated August 5th.

Messrs. John Cashman and Charles W. Morse have purchased the charter of the Rochester (N. H.) Gas Company, and propose to construct a gas plant at that point forthwith. The named parties are residing at Haverhill, Mass., and are responsible for any contracts they may make.

At the annual meeting of the Pittsfield (Mass.) Coal Gas Company, no change was made in the executive management. The Company's trading is increasing in most satisfactory way.

Ex-Mayor Charles H. Blood, of Fitchburg, Mass., is proposing a most sanguinary warfare on the Fitchburg Gas and Electric Company, the properties of which he shrieks should be owned and operated by the

city. Blood is a candidate for Mayor at the next election, and "municipal ownership" is his battle cry.

THE General Gas Light Company of Kalamazoo, Mich., has issued the following timely and sensible warning to its customers, present and prospective: "During the last 3 years we have been unable to fill our orders promptly during the months of September, October and November, notwithstanding that we have worked our factory night and day during those months. It now looks as if the demand would be very large again this fall, and in order to avoid delays in shipping we are asking our patrons to place with us an estimate of their requirements for this season's business, so that we may have the goods made up and ready. We have entered orders for 2,800 lamps during the last 3 days for delivery in September. We will be greatly pleased if you will kindly let us know about what number you think you will need, and we will get the work forward without any obligation on your part in case you do not take the lamps." That certainly is liberal enough.

WITH much regret we report the death of Mr. Thomas B. Fogarty, who passed away at his home in Brooklyn, N. Y., July 29th. Mr. Fogarty was in his 76th year, and was elected to membership in the American Gas Light Association, October, 1881, and was an ardent student of plans and methods for the recovery of cyanogen from gases produced by special methods of water gas manufacture.

A CORRESPONDENT in Boone, Ia., writing under date of the 6th inst. says: "Boone will not build and operate a municipal lighting plant. That was decided at the special election last Monday by a decisive vote. There was not much interest taken in the campaign. The majority of the citizens felt that the Council had made a good contract on account of public lighting, and were satisfied. There was activity enough among the socialists and probably every vote they could muster was cast. The vote was: Against, 827; in favor, 565."

AFTER having been operated for several years by other parties under a sub-lease, the gas plant at Mechanicsburg, Pa., has been repurchased by the original proprietors—the Mechanicsburg Gas and Water Company. The Company, the active official head of which is Mr. L. R. Spong, of West Fairview, proposes to expend a considerable sum of money in betterments. The Superintendent of the Company is Mr. H. L. King.

A CORRESPONDENT in Poughkeepsie, N. Y., writing under date of the 5th inst., says: "Mr. George A. Swayze has been appointed permanent receiver of the Orange County (N. Y.) Gas and Electric Light Company, with power from the court to operate the business or to sell the same. It is said that Mr. P. N. Jackson, of Newark, N. J., a former owner, who holds $36,000 of the $114,000 second mortgage bonds, contemplates foreclosing for default of interest, which was due July 1st; but action on such account, under terms of the mortgage, cannot be taken until 60 days have elapsed. The Orange County Trust and Safe Deposit Company is trustee for the second mortgage bondholders. The interest on the first mortgage issue ($10,000) is not in default."

THE output of the Cincinnati Gas and Electric Company for July, 1904, exceeded that for the corresponding month of 1903 by 25,000,000 cubic feet.

MR. F. N. HOLIDAY has resigned as Superintendent of the Alpena (Mich.) Gas Company.

THE Oakland (Cal.) Gas Company is considering the advisability of extending its mains to the outlying district of Fruitvale.

ON the 5th inst., City Auditor Madigan, of Cleveland, O., turned into the city treasury a check for $35,985.40 from the Cleveland Gas Light and Coke Company, and one of $9,545.91 from the Peoples Gas Light Company, which sums represent the returns, under the ordinance governing the companies, to the city on the business of the companies transacted during the first half of 1904.

A GAS company to furnish gas to the residents of Pennsgrove, N. J., has been incorporated by Messrs. Joseph D. Whittaker, W. A. Hunt, H. E. Crompton and Wm. F. Yeager.

THE enlargements to the plant of the Mason City, Iowa, Gas Company have been completed. In effect the plant may be rated a new one.

THE Hopkinsville (Ky.) Gas Light and Power Company has been reorganized under the title of the Hopkinsville Gas and Electric Company. The capital stock is divided into preferred and common shares, 5 per cent. interest per annum on the first named description being warranted. The incorporators are Messrs. W. T. Tandry, James A. Young, Jr., and W. C. White.

THE Newark (N. J.) *News* is responsible for the statement that at a recent meeting of the Ocean Grove (N. J.) Camp Meeting Association it was decided to construct a gas plant, the same to be operated by the Association. The cost of the outfit complete is estimated at $80,000.

AT a meeting of the Florence (Ala.) City Council, held some days ago, Messrs. Geist and Kelsey, who recently purchased the plant and franchises of the Florence Gas Light and Fuel Company, were granted a 30-year extension under which the Company has been operating. The plant is to be enlarged, and main extensions to the outlying districts of Sheffield and Tuscumbia have been arranged for.

A SPECIAL meeting of the shareholders in the Consumers Gas Company, of Toronto, Ont., will be held to-morrow in the Company's offices, for the purpose of authorizing an increase in the capital stock, to decide upon the amount to be issued and to empower the Directors in that behalf.

THE owners of the Waco (Tex.) Gas Company are expending quite a sum of money on plant betterment.

MR. A. B. PARMENTER has been granted a franchise for the construction and operation of a gas and electric light plant in Scotland, S. D.

R. S. MCCRARY has applied for a franchise to operate a gas plant in Concordia, Kas. The place is not large enough to support such an enterprise.

WATERTOWN, S. D., declares that it wants a gas works. The reference above to Concordia, Kas., would seem also to apply to the Watertown project.

THE International Acetylene Association will meet in St. Louis, Sept. 14 to 16. The sessions will be held in the Assembly Hall of the Palace of Education and Social Economy.

JUSTICE GAYNOR, of the Supreme Court, recently handed down a decision vacating the temporary injunction which Samuel V. Abeel, a taxpayer of Manhattan, obtained some time ago against John T. Oakley, Commissioner of Water Supply, Gas and Electricity, restraining him from entering into a contract with the Consolidated Gas Company to light the streets of Manhattan and the Bronx at $24.75 per lamp, of the Welsbach street lighting type. He also denied the motion to make the injunction permanent pending final decision in another action along the same lines. The plaintiff, Abeel, declared that Commissioner Oakley advertised for bids, and that when he opened them the only bid considered was that of the Consolidated Gas Company, although the American Street Lamp and Supply Company was the lowest bidder. Abeel alleged the bid of the Consolidated Company was excessive. A fair price was $16 per lamp, he thought. He declared that the Consolidated was enabled to charge such excessive rates because they possessed a monopoly in Manhattan and the Bronx. In his decision Justice Gaynor says:

"The price seems to have been carefully fixed by the exercise of official judgment and discretion after the prescribed routine. Discretion is not reviewable by the courts in a taxpayer's action, and, as no fraud is alleged in the complaint, the case must therefore fail, there being no illegality. The allegation that the contract is for both Manhattan and the Bronx, or that bids were called for in the territory of both boroughs combined, seems to be a mistake. It is on information and belief only and the facts seem to be to the contrary."

It is claimed by Commissioner Oakley that the price he has obtained is the lowest ever secured in the city. The city will be saved $80,000 by the present contract for the lighting of 22,000 lamps. The Commissioner declared it was not a question of gas but of mantles, which he thought the defendants could furnish in superior quality.

A RECENT pamphlet by the Jeffrey Manufacturing Company, of Columbus, O., contains instructions for the care and operation of direct current electric generators.

The Market for Gas Securities.

There was considerable trading done in Consolidated in the week, the net result being virtually a standoff, as the closing prices for to-day (Friday) show. The feature of the business, however, was that the market stoutly withstood a well-formulated bear attack.

Brooklyn Union was reported in two or three actual transfers during the week, the high price being 217, ex-div. of 2½ per cent. Peoples, of Chicago, more than maintains its recent advance, 101, ex div. being bid for it at the close. The feature of the general market is that reflecting the likely way of the lighting interests of Baltimore. It is quite certain that an amalgamation of the gas and electric interests there will take place this fall, with the likelihood that the electric end will have to pay the fiddler. Baltimore gas is 79¼ bid. Par would not be too much for it. Those who think that the Westchester (N. Y.) Lighting Company is still under the active control of the U.G.I. Company should alter their thought-line. Public Service Corporation, of N. J., securities are active and strong.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 Wall Street, New York City.

August 15.

☞All communications will receive particular attention.

☞The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	195¼	194
Central Union, Bonds, 5's.	3,000,000	1,000	106⅛	106⅛
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan	658,000	..	108	112
Mutual	3,500,000	100	270	300
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co..				
Bonds, 5's	11,000,000	1,000	107⅛	109
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	85	..
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	..	..
Northern Union, Bonds, 5's.	1,250,000	1,000	103⅛	105⅛
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	111	113
" 1st Con. 5's	1,500,000	..	106	108
Standard	5,000,000	100	125	13
Preferred	5,000,000	100	145	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	180	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	216	220x
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	⅛	3/16
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	500,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	3¾	4
" " Bonds, 5's	5,250,000	1,000	19¾	..
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	103	103½
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	97½	99
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89¼
Preferred	3,026,500	100	107½	109
Consumers, Toronto	2,030,000	50	200	204
Consolidated, Baltimore	11,000,000	100	79¾	79⅝
Mortgage, 6's	3,000,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,400 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	980,000	1,000	86	90
Consolidated G. & E. Co.'s.				
Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	951,000	1,000	75	75¼
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	67	68
" Bonds, 5's	10,500,000	..	103½	104½
Indianapolis	2,000,000	..	60	70
" Bonds, 6's	2,650,000	..	103½	106½
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	200,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	35
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	..
Preferred	2,500,000	100	75	100
Bonds	10,000,000	1,000	109½	110

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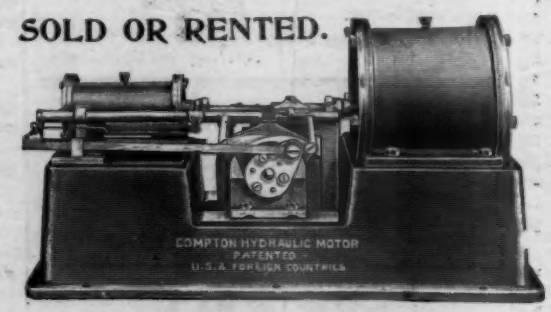

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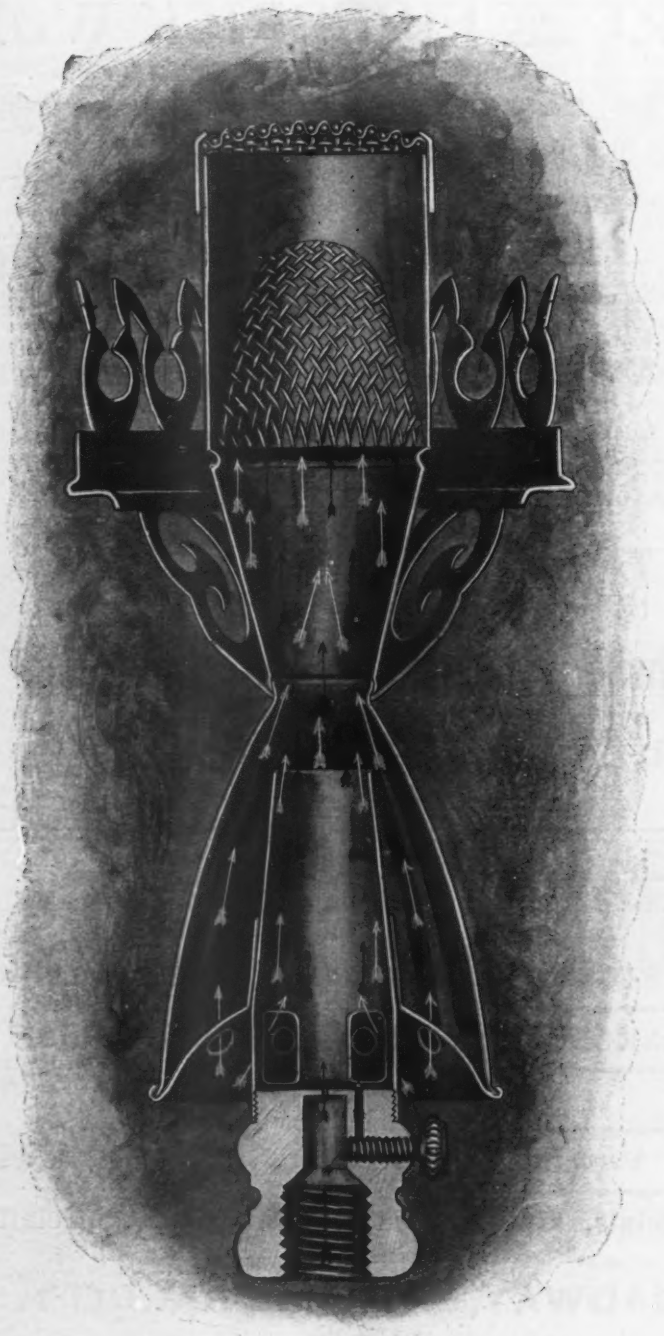

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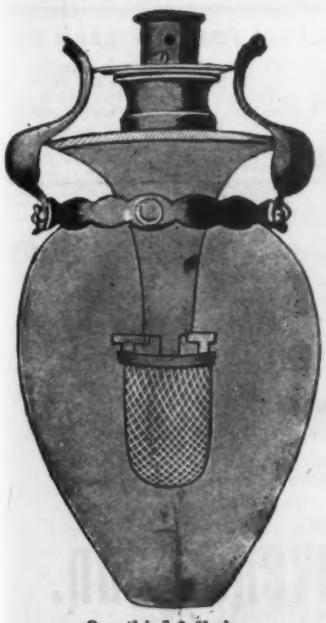

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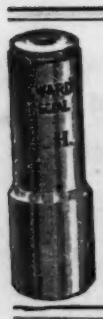

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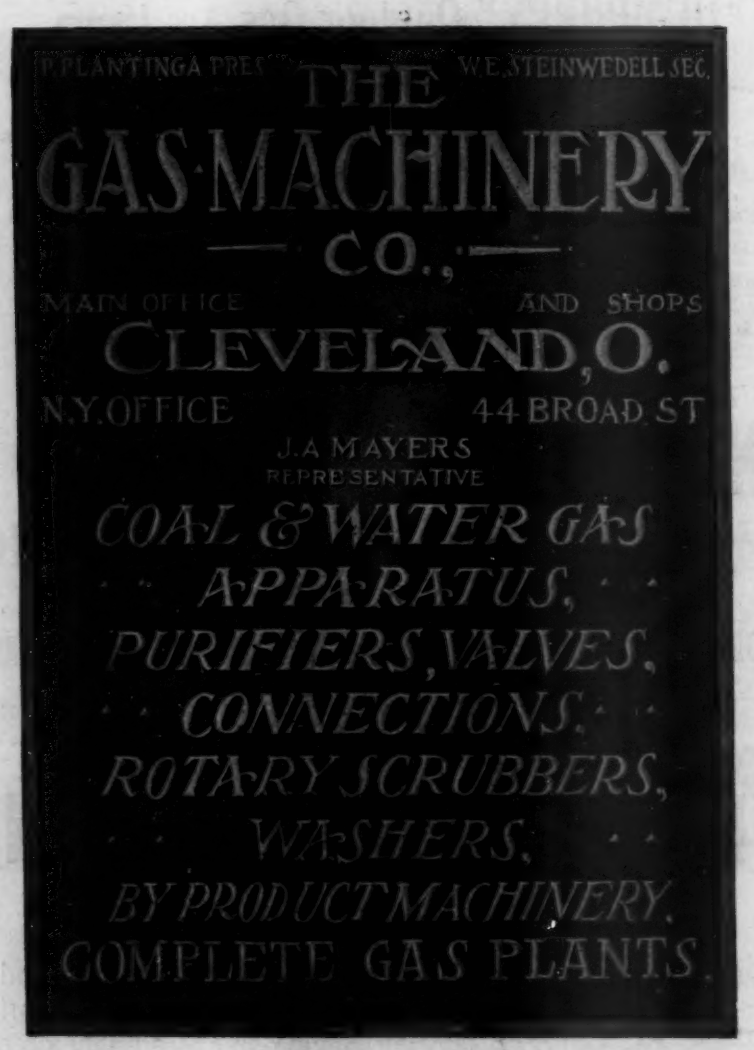

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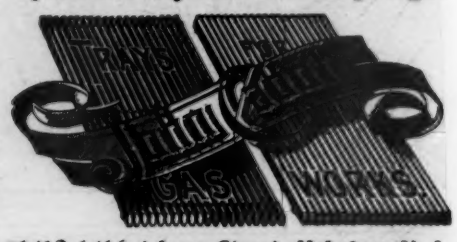

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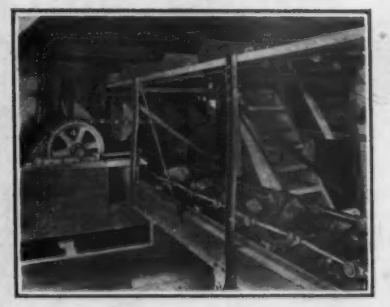

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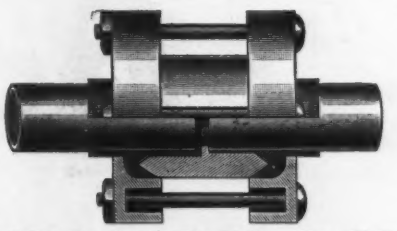

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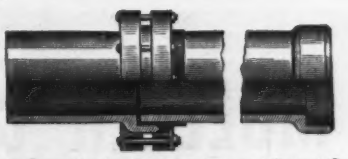

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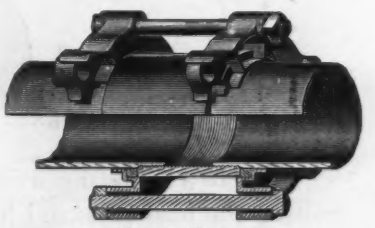
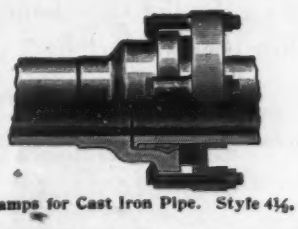


Clamp. Style 4.



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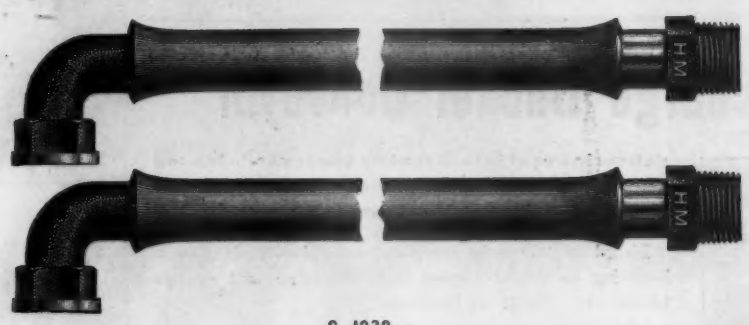

C—1039.

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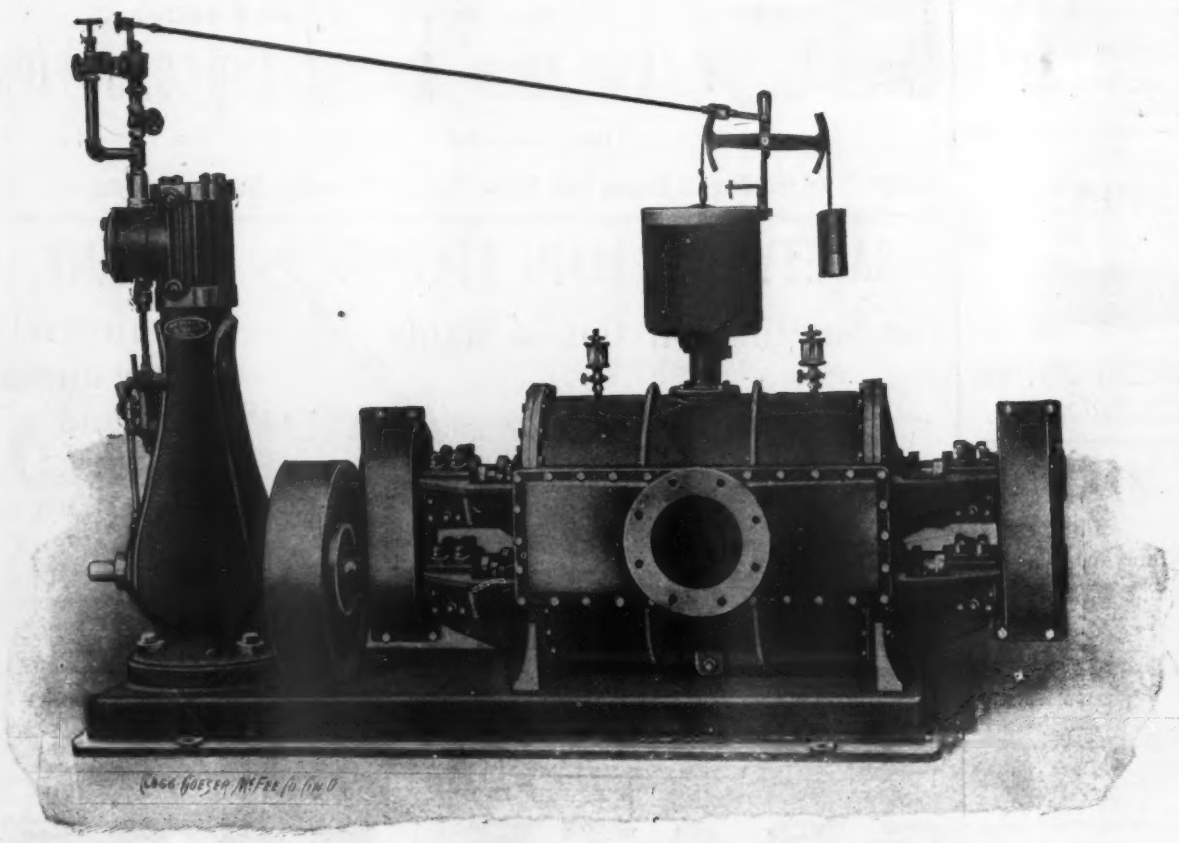

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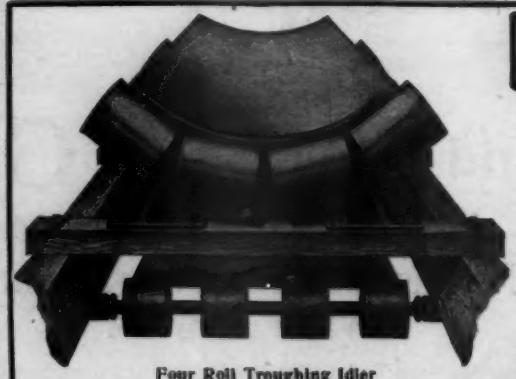

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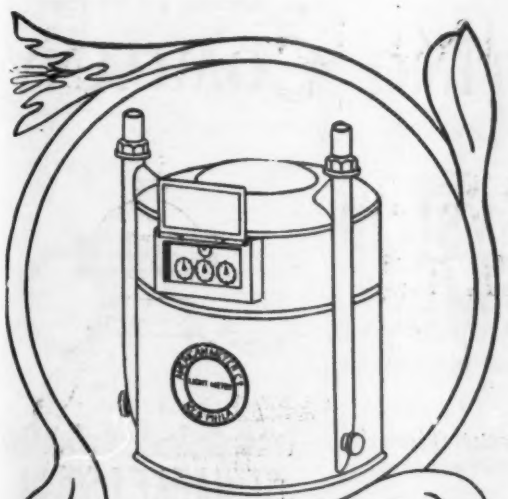

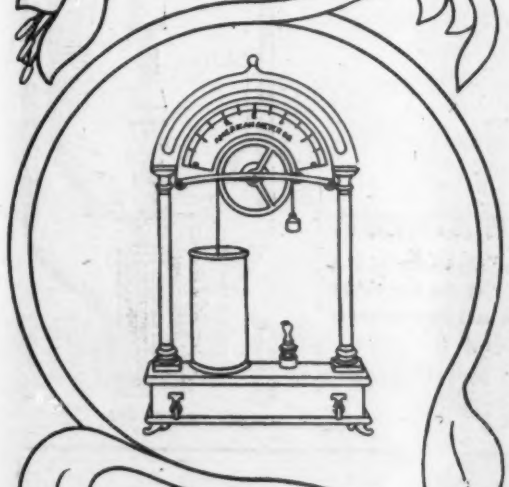

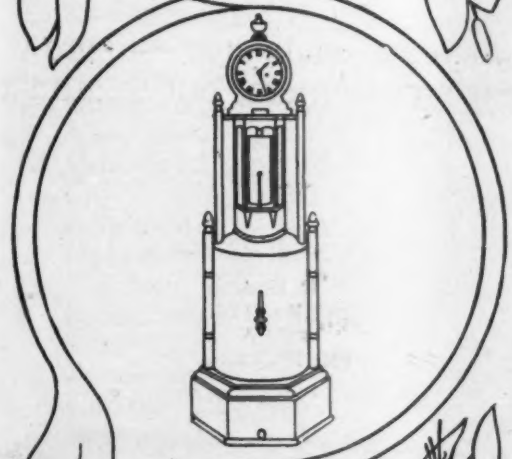

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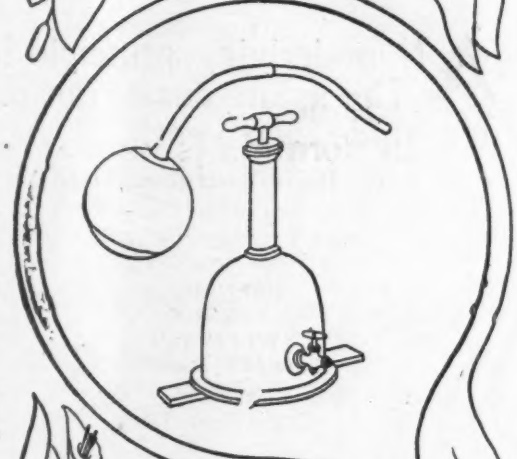
PUBLIC LIGHTING TABLE.

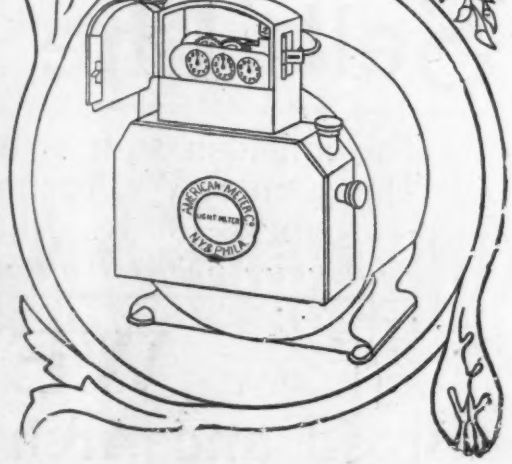
SEPTEMBER, 1904.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Thu.	1	7.00 PM	11.10 PM	6.30	4.20
Fri.	2	7.00 LQ	11.50	6.30	4.20
Sat.	3	7.00	12.40 AM	6.15	4.30
Sun.	4	6.50	1.30	6.15	4.30
Mon.	5	6.50	2.40	6.15	4.30
Tue.	6	6.50	4.30	6.15	4.30
Wed.	7	6.50	4.30	6.15	4.30
Thu.	8	6.50	4.30	6.15	4.30
Fri.	9	6.50 NM	4.30	6.15	4.30
Sat.	10	6.50	4.30	6.05	4.40
Sun.	11	6.40	4.40	6.05	4.40
Mon.	12	6.40	4.40	6.05	4.40
Tue.	13	6.40	4.40	6.05	4.40
Wed.	14	8.40	4.40	6.05	4.40
Thu.	15	9.20	4.40	6.05	4.40
Fri.	16	10.10 FQ	4.40	6.05	4.40
Sat.	17	11.00	4.40	5.55	4.50
Sun.	18	12.00	4.50	5.55	4.50
Mon.	19	12.50 AM	4.50	5.55	4.50
Tue.	20	1.50	4.50	5.55	4.50
Wed.	21	2.40	4.50	5.55	4.50
Thu.	22	3.40	4.50	5.55	4.50
Fri.	23	No L.	No L.	5.55	4.50
Sat.	24	No L. FM	No L.	5.40	5.00
Sun.	25	No L.	No L.	5.40	5.00
Mon.	26	6.20 PM	8.00 PM	5.40	5.00
Tue.	27	6.20	8.30	5.40	5.00
Wed.	28	6.20	9.10	5.40	5.00
Thu.	29	6.20	9.50	5.40	5.00
Fri.	30	6.20	10.40	5.40	5.00

TOTAL HOURS LIGHTING DURING 1904.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	225.00	January	423.20
February	205.40	February	367.40
March	187.40	March	355.35
April	169.50	April	298.50
May	152.30	May	264.50
June	137.20	June	234.25
July	138.50	July	243.45
August	151.00	August	280.25
September	164.40	September	321.15
October	191.30	October	374.30
November	210.30	November	401.40
December	237.10	December	433.45
Total, yr.	2171.40	Total, yr.	4000.00





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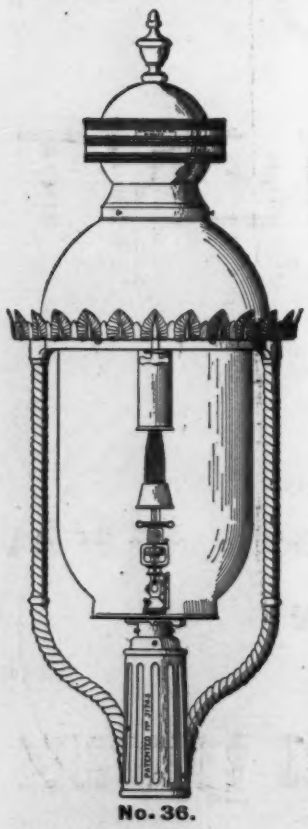

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Aberdeen, S. D.	Boone, Ia.	Easton, Pa.
Winsted, Conn.	Pueblo, Col.	Lawrence, Mass.
Canon City, Col.	Charlotte, N. C.	Council Bluffs, Ia.
Schenectady, N. Y.	Fall River, Mass.	Chattanooga, Tenn.
Hagerstown, Md.	Duluth, Minn.	Tuckerton, N. J.
Malden, Mass.	New York (Mutual Co.)	Springfield, O.
Bridgeport, Conn.	Waltham, Mass.	Easton, Pa. (2d contract).
Albert Lea, Minn.	Dover, Del.	Mobile, Ala.
Brooklyn, N. Y.	York, Pa.	Conshohocken, Pa.
Kansas City, Kas.	Minneapolis, Minn.	Mason City, Ia.
Hempstead, N. Y.	Allentown, Pa.	

TOTAL SETS FOR 1903, ... 62
TOTAL DAILY CAPACITY, ... 62,950,000 cubic feet.
TOTAL SETS TO DATE, ... 508
TOTAL DAILY CAPACITY, ... 362,780,000 cubic feet.

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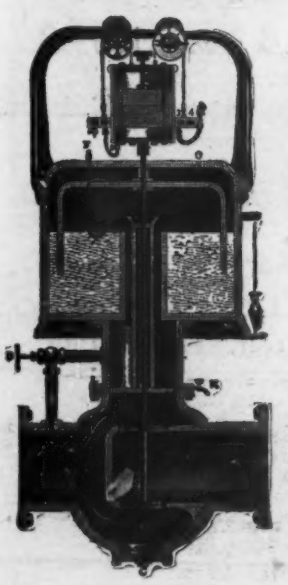

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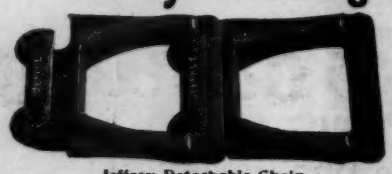

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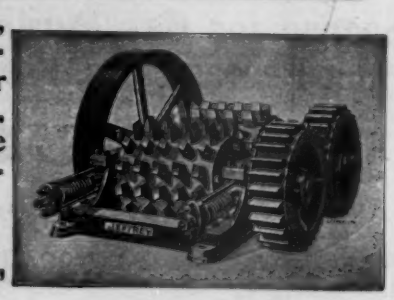

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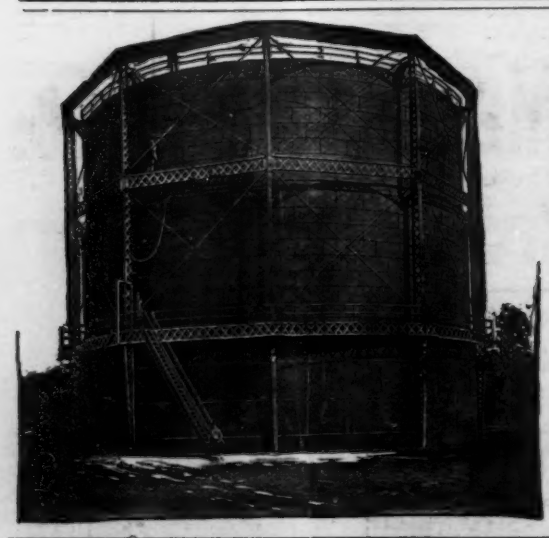

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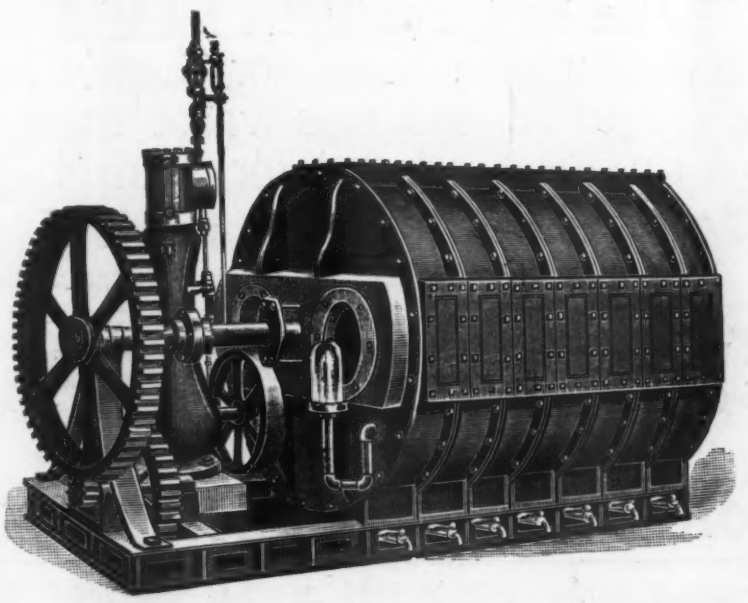

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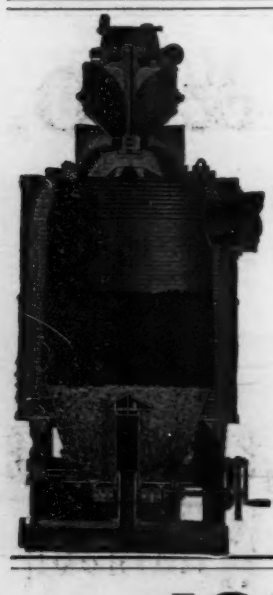

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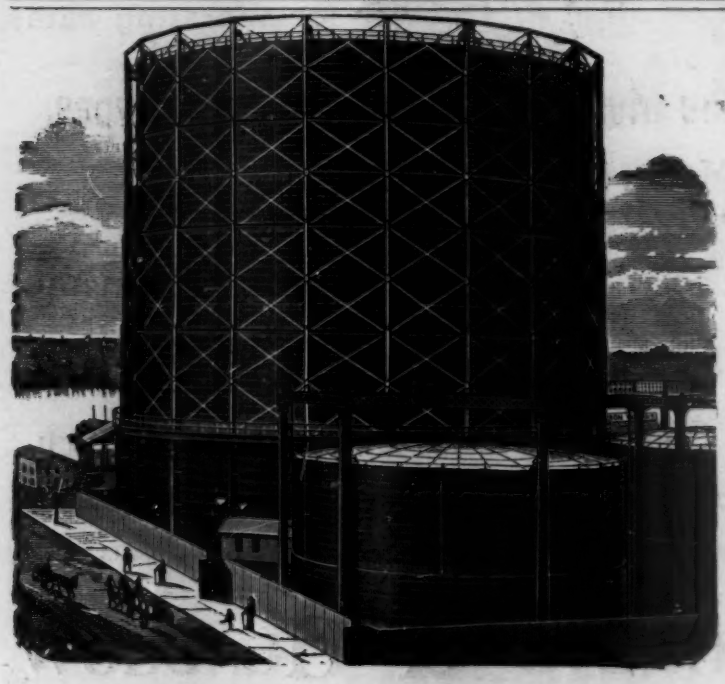

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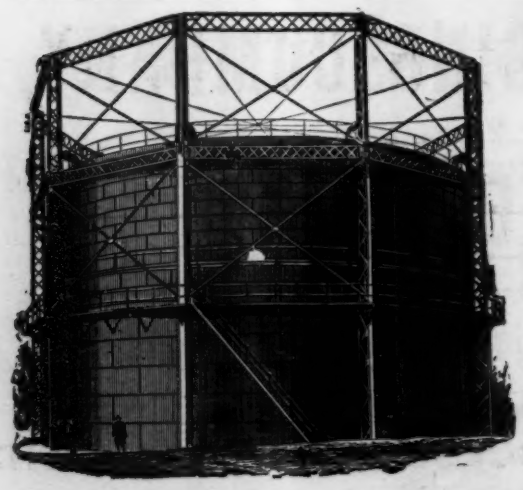

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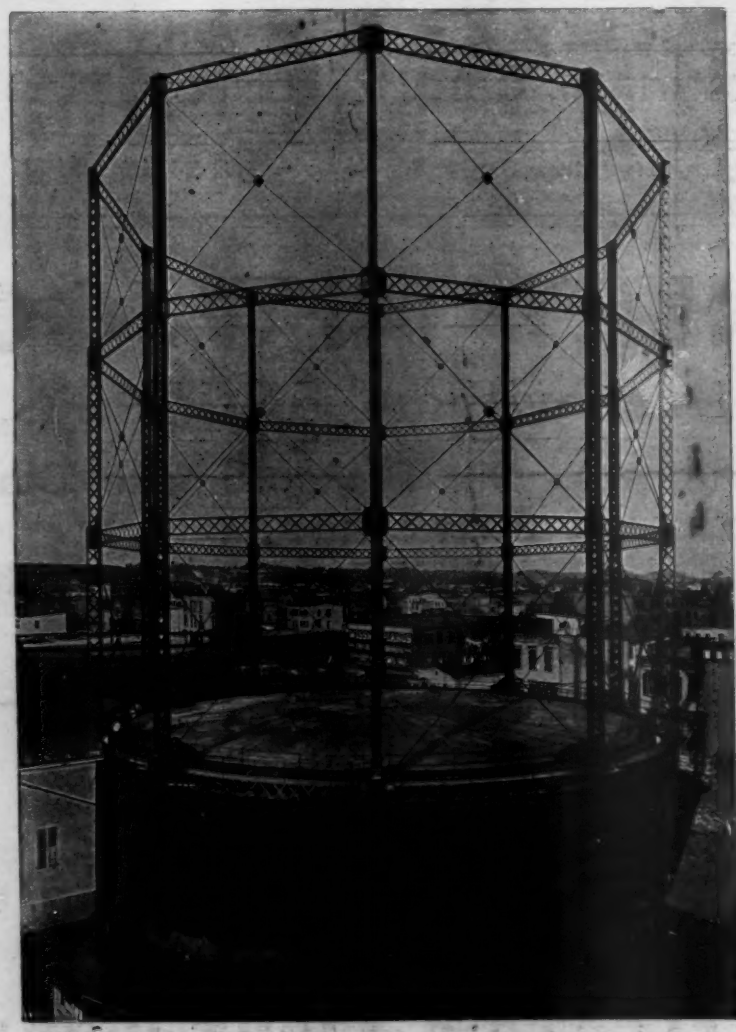

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